MONTHLY WEATHER REVIEW.

Editor: Prof. Cleveland Abbe. Assistant Editor: Herbert C. Hunter.

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The Monthly Weather Review is based on data from about 3500 land stations and many ocean reports from vessels taking the international simultaneous observation at Greenwich noon.

Special acknowledgment is made of the data furnished by the kindness of cooperative observers, and by R. F. Stupart, Esq., Director of the Meteorological Service of the Dominion of Canada; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. I. S. Kimball, General Superintendent of the United States Life-Saving Service; Commandant Francisco S. Chaves, Director of the Meteorological Service of the Azores, Ponta Delgada, St. Michaels, Azores; W. N. Shaw, Esq., Director Meteorological Office, London; H. H. Cousins, Chemist, in charge of the Jamaica Weather Office; Rev. L. Gangoiti, Director of the Meteorological Observatory of Belen College, Havana, Cuba.

As far as practicable the time of the seventy-fifth meridian is used in the text of the Monthly Weather Review.

Barometric pressures, both at land stations and on ocean vessels, whether station pressures or sea-level pressures, are reduced, or assumed to be reduced, to standard gravity, as well as corrected for all instrumental peculiarities, so that they express pressure in the standard international system of measures, namely, by the height of an equivalent column of mercury at 32° Fahrenheit, under the standard force, i. e., apparent gravity at sea level and latitude 45°.

FORECASTS AND WARNINGS.

By Prof. E. B. Garriott, in charge of Forecast Division.

A COLD SPRING.

For the period that began about April 1, and continued thru the first decade of June, the mean temperature for the United States generally east of the Rocky Mountains was lower by several degrees than for the same period of any previous year of which there is a record. April was the coldest month of that name in thirty-two years, May the coldest May in twenty-five years, and the cold period was not broken until the early part of the second decade of June.

The primary cause of this period of abnormal cold is not known. That periods of unseasonable weather over any considerable area of the earth's surface are due to certain disarrangements of our atmosphere is, however, apparent, and the association of the various normal and abnormal arrangements of the atmospheric areas with certain types of seasonal and unseasonable weather has been fixt.

The arrangement of the earth's atmosphere in waves, or crests, and troughs, or depressions, is indicated by barometric observations. When the crests, or high barometer areas, and depressions, or low barometer areas, have a normal distribution over the Northern Hemisphere, seasonable weather is experienced. When the distribution of the great barometric areas is abnormal, the weather will be unseasonable over the greater portion of the hemisphere. The character of the departures from the average seasonal conditions will be governed by the character of the disarrangement of the continental and oceanic high and low barometric areas, or "centers of action".

Air, like water, flows from crests toward depressions. It is apparent then, that air will flow from areas of high barometer toward areas of low barometer. It is also apparent that during periods of abnormally high pressure over British America, and persistently low pressure over the southern portions of the United States, the air that flows from the northern latitudes of the continent toward the depressions in the south is cold air. This was the general character of the barometric arrangement, or disarrangement, during the spring of this year. And a similar distortion of atmospheric pressures over the North Atlantic Ocean, that showed abnormally high barometer over the Iceland area, caused unseasonably cold weather over continental Europe. With a knowledge of the cause of disarrangements of the greater atmospheric areas will come the ability to foresee weather changes for considerable periods in advance.

The month opened with low barometric pressure over the Iceland area. This depression reached its greatest depth on the 3d, and during the succeeding five days drifted slowly eastward over Europe and the western portion of Asiatic Russia. A second depression covered Iceland from the 8th to 12th. During the balance of the month pressure was high over the extreme North Atlantic. Azores and Lisbon pressures were prevailingly low thruout the month.

Of special interest at the present time is the following description of the cold summer of 1816. This description is taken from The Half Century, published in 1851, written by Emerson Davis and containing an introduction by Dr. Mark Hopkins of Williams College:

> During the first half of January, 1816, the weather was extremely cold. At Springfield, Mass., on the morning of the 11th, the mercury fell 11° below zero. The summer of that year is still remembered as the cold summer. There were frosts in Massachusetts during each of the summer months, and in low grounds pretty severe. On the mountains of Berkshire, on the 6th of June, the snow fell several inches in depth, and travelers suffered much from the severity of the storm. The snow was 10 inches deep in the central parts of Vermont and New Hampshire. On the morning of July 4, ice was formed of the thickness of common window glass in the Northern and Middle States, and much of the corn was killed. August was a most cheerless month; ice formed half an inch in thickness. The cold extended to Europe. Some of the English papers said "1816 will be remembered as the year in which there was no summer". Very little corn ripened that year. Farmers paid $5 a bushel for seed corn the next spring.

The types of unseasonable weather that have been experienced in the past will be experienced in the future. The cold summer of 1816 will doubtless be repeated. When? We do not know. We have had years and periods of years of drought and plenteous rainfall, and will have them again. Nothing new in the weather line has occurred in historic times, and nothing new can occur until the order of our solar system is changed.

IN GENERAL.

In extreme western districts May temperature was about or slightly above the normal. During the early portion of May heavy frosts occurred in northern districts of the United States, and light frosts to northwestern Texas, Oklahoma, Arkansas, Tennessee, and the interior of the Middle Atlantic States. In the second decade of the month light to heavy frosts were reported in the Lake region and north-central valleys, and light frost in Arkansas, Tennessee, and interior districts of the Middle Atlantic States. In the third decade cold weather records for the season were broken in some sections of the interior-central, east-central, and Northeastern States. On the 27th a temperature of 42° was noted at St.

Louis—the lowest noted for that date and place in seventy-one years. On the same day the temperature was below freezing in southwestern Kansas. From the 20th to 22d a frost-bearing cool wave swept from the Northwestern States over the Lake region, Ohio Valley, and the Middle Atlantic States.

In the second decade excessive rainfalls occurred in the central and lower Mississippi Valley and the east Gulf States. In the third decade heavy rains caused the overflow of many streams in Texas, and heavy rains on the 18th and 19th caused flood stages in the Willamette River. On the 3d and 4th snow fell from the States of the lower Missouri Valley over the upper Lake region, northern Illinois, and northern Ohio, breaking generally thruout that region the snowfall record for May. At Omaha 4 inches fell on the 3d, and at Chicago the fall amounted to 0.8 of an inch. In the second decade snow fell in the lower Missouri Valley on the 14th, and in the upper Mississippi and Ohio valleys and the Lake region on the 15th. Snow was reported in the third decade of May from the middle and northern Rocky Mountain districts over the Great Lakes.

The first important storm of the month advanced from Texas over the Ohio Valley, lower Lakes, and the Canadian Maritime Provinces during the 3d and 4th. From the 11th to 16th a barometric trough that extended from Canada to the Gulf of Mexico moved slowly from the Rocky Mountain districts to the Atlantic coast. The third notable barometric depression of the month advanced from the southern Rocky Mountain region to the middle and northern Atlantic coasts from the 24th to 27th. In all cases vessels were forewarned of the approach of dangerous gales in ample time to seek shelter.

On the 6th a tornado was reported 40 miles west of Mount Pleasant, Tex., and the towns of Ridway, Birthright, and Antioch suffered damage. On the 19th severe thunderstorms with heavy rain and hail occurred in the Middle Atlantic States. On the 24th and 25th severe rain and local storms were reported in Texas and Oklahoma.

BOSTON FORECAST DISTRICT.

The average temperature was the lowest recorded for May since observations have been compiled in the present form, beginning in 1888. Precipitation was unevenly distributed, but was, as a whole, below the normal. At a number of stations having long records snow has never been known to fall at so late a date as in May, 1907. There were no gales, and no storm warnings were ordered. Frost warnings were issued to cranberry growers on the 11th and 21st, the temperature in the bogs falling to 25° or below on the 11th, and to 28° or below on the 21st. Berries that were not protected doubtless suffered damage.—*J. W. Smith, District Forecaster.*

NEW ORLEANS FORECAST DISTRICT.

The month was abnormally cold and precipitation was excessive generally thruout the district. On the 3d frost warnings were issued for the northwestern portion of the district and warnings of freezing temperature for the Texas panhandle. Subsequent conditions justified the warnings. No general gales occurred on the coast.—*I. M. Cline, District Forecaster.*

LOUISVILLE FORECAST DISTRICT.

The month was remarkably cold and, with the exception of three periods of one to three days each, the temperature continued below the normal. On the 5th, 12th, 21st, and 28th frost occurred over the whole or the greater portion of Kentucky, and on the 5th over northern Tennessee. Frost warnings were in each instance issued in advance of the occurrence of frost.—*F. J. Walz, District Forecaster.*

CHICAGO FORECAST DISTRICT.

Abnormally low temperature continued thruout the district. Frost warnings that were issued on several dates were justified at practically all stations. Storm warnings were issued on the 11th, 12th, 13th, 14th, and 26th. The warnings were well in advance of approaching storms and, as no casualties occurred, were evidently of material benefit to navigation.—*H. J. Cox, Professor and District Forecaster.*

DENVER FORECAST DISTRICT.

Precipitation, often in the form of snow, was frequent, and as a rule in excess of the normal, while low mean temperatures were noted at all stations. In southern Wyoming, Colorado, and northern New Mexico the month was the coldest May on record. Freezing temperatures occurred at intervals, except in southern portions of New Mexico and Arizona. The frosts and freezes were covered by the forecasts and special warnings.—*F. H. Brandenburg, District Forecaster.*

SAN FRANCISCO FORECAST DISTRICT.

Altho the mean temperature was normal at many stations, in the matter of storm frequency, amount and frequency of precipitation, and air circulation the month was unlike the normal May. There was a well-marked tendency for depressions originating apparently over the Valley of the Colorado to pass eastward over northern Texas, the lower Mississippi Valley, and thence northeastward.—*A. G. McAdie, Professor and District Forecaster.*

PORTLAND, OREG., FORECAST DISTRICT.

The month was slightly warmer than usual, and rainfall was deficient. There were but two periods of general rains, on the 10–11th and 18–19th. The first was attended by high winds. There were a number of light frosts in the eastern portion of the district, and two mornings of heavy frost in southern Idaho. The annual rise in the Columbia River began on the 10th and the rise thereafter was slow and steady. Timely warnings were issued for all storms and for most of the frosts that occurred.—*E. A. Beals, District Forecaster.*

RIVERS AND FLOODS.

The slow drift from Texas northeastward of a poorly defined depression from May 5 to 8, inclusive, was attended over the Southern States by the general rains usually incident to depressions of this type. Over eastern Texas, Louisiana, Arkansas, Mississippi, Alabama, and western Tennessee, the rainfall, altho not evenly distributed, was heavy, especially over the lower Red and lower Arkansas valleys, and the States of Louisiana and Mississippi generally. The resulting floods were moderate, except in the Blue and White rivers of Arkansas, where the crest stages ranged from 4 to 18 feet above the flood line, the greatest excesses occurring over the upper portions of the rivers. In the lower Mississippi River the crests were slightly above the flood stages; in the rivers of southeastern Mississippi from 3 to 5 feet above, and in the lower Tombigbee River 12 feet above.

Over portions of eastern Texas considerable damage was done, especially along the creeks and smaller rivers; but elsewhere the losses were moderate and in some localities the high waters were of great assistance in moving logs to the mills. However, a large amount of property was saved by removal in accordance with the Weather Bureau warnings, which were issued with the usual promptness and were fully justified.

Special commendations of the work of the Bureau have been received from southeastern Mississippi, where the service is of comparatively recent establishment, one observer reporting that there has been no loss of stock since the service was inaugurated.

Warnings on the 23d and 26th for rises in the Rio Grande between Albuquerque and El Paso were also correct to within a small fraction of a foot.

The annual rise of the Columbia was well in progress by the 17th of the month, and the usual forecasts and warnings began on that date.

The river district of Phoenix, Ariz., was established on May 1, 1907, with territory comprising the watershed of the Gila River. Special river stations have been located at Tempe,

Ariz., on Salt River, and at the crossing of the Maricopa, Phoenix, and Salt River Valley Railroad over the Gila River; and special rainfall stations at Benson, Flagstaff, Jerome, San Carlos, and Seligman, Ariz.

Service has also been inaugurated along the Colorado River, under the supervision of the local office of the Weather Bureau at Denver, Colo., and special river stations have been located at Fruita, Colo., on the Grand River, at Elgin, Utah, on the Green River, and at Grand Canyon and Topock, Ariz., on the Colorado River.

The highest and lowest water, mean stage, and monthly range at 293 river stations are given in Table VI. Hydrographs for typical points on seven principal rivers are shown on Chart I. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Professor of Meteorology.*

SPECIAL ARTICLES, NOTES, AND EXTRACTS.

DR. ALEXANDER BUCHAN.

When Gen. Albert J. Myer was ordered by the Secretary of War to carry out the provisions exprest in the act of Congress of February 9, 1870, establishing what we now know as the United States Weather Bureau, it was necessary for him to begin by educating a corps of practical meteorologists. To do this he organized a school of instruction at Fort Whipple, Va. (now Fort Myer), adjoining Arlington, near Washington, D. C. The only two text-books available at that time were Loomis's Treatise on Meteorology and Buchan's Handy Book of Meteorology, the second edition of which had just been published. Professor Loomis himself past away in 1889, and now we are called upon to record the death, on the 13th of May, 1907, of Dr. Alexander Buchan, at the age of 78. This removes from the world of science a man of world-wide reputation—an indefatigable worker in meteorology, and one whose influence has been widely felt. We are indebted to his colleague, R. T. Omond, esq., honorary secretary of the Scottish Meteorological Society, for a beautiful tribute to the memory of Doctor Buchan which has furnished material for the following lines.

Doctor Buchan was born in 1829, at Kinnesswood, in Kinross-shire, not far from Edinburgh; and in due time he found his way to that center. He graduated at the university and devoted himself to teaching until 1860, when an affection of the throat compelled him to lay aside the profession of his choice; but he always retained his interest in it, as well as in field botany. In 1860 he was appointed secretary to the Scottish Meteorological Society, in whose journal he published many of the results of his labors, until the time of his death. In 1869, in Volume XXV of the Transactions of the Royal Society of Edinburgh, there appeared one of the most famous papers of the day, entitled "The mean pressure of the atmosphere and the prevailing winds over the globe". Doctor Buchan had accomplished the Herculean task of coordinating the available data for the whole world. He had brought order out of chaos. He had accomplished a feat that had been declared by many to be impossible, of which Supan has said: "If Buchan had been more cautious we might still to-day be without the isobars of the globe". It is worth recording that an equally great work was being carried on at almost exactly the same time by the eminent Prof. James Henry Coffin, under the auspices of the Smithsonian Institution, "On the Winds of the Northern Hemisphere", embracing all the available records up to the end of the year 1869, but its publication was delayed by the death of Professor Coffin, in 1873. The areas of high and low pressure with their seasonal changes were first made known to the world thru this great work of Buchan's, and no revision of that work was published or perhaps possible until he himself made it in his monograph of 1889, "On Atmospheric Circulation", published in Volume II of the physical and chemical series of the Challenger Reports.

During the last ten years of his life Doctor Buchan was an enthusiastic advocate of the establishment of mountain stations, especially the high-level station on the summit of Ben Nevis. This station was maintained with more or less completeness from December, 1883, to October, 1904, and a supplementary low station, at Fort William, from August, 1890, to October, 1904. The complete record and discussion of these observations fills three volumes of the Transactions of the Royal Society of Edinburgh, which were compiled and edited by Doctor Buchan and Mr. Omond conjointly, forming a magnificent monument to one who served Science for her own sake—loving the work, and content with scant financial rewards.

An equally splendid monument to Buchan is the important chapter that he wrote in the compilation of The Atlas of Meteorology, published by Bartholomew in 1899. Doctor Buchan's work earned for him many recognitions in the shape of prizes and positions. During the last year of his life he received the well-deserved honor of election as a vice-president of the Royal Society of Edinburgh. For a considerable time he was a member of the Meteorological Council of the Royal Society at London. He was also inspector of stations for this council, and in that capacity traveled over the greater part of Scotland.

But it is not to his scientific worth alone that we must give testimony. He was a man of great simplicity of nature; he had a wide human sympathy and a singularly genial temperament. His wonderful memory and genial disposition placed his great store of knowledge at the service of others. He was also a valued elder in the St. George's Free Church. His wife died in 1900, but his only son, Dr. A. Hill Buchan, survives him.

We add the following extracts from a memorial article by W. N. Shaw, esq., as published in Nature, London, May 23, 1907:

A few words as to Buchan's scientific work must suffice. With Baxendell, of Manchester, he was largely instrumental in securing the general acceptance of Buys Ballot's principle of the relation of wind to air pressure. He had the faculty of statistical insight, and realized that by the appropriate combination of many observations it was possible to trace the interdependence of phenomena which might be affected separately by a number of independent causes. This insight is illustrated in a remarkable way by his papers with Sir Arthur Mitchell upon the relations of climate and health in London. Such a method of investigation does not always commend itself to the student of physics, who, fortunate in having the conditions under his own control, is accustomed to trace the direct connection between cause and effect in each separate experiment. But the remarkable results of Buchan's work, which still remains to be followed up, enable one to understand the enthusiasm for collecting observations, and more observations, that seem purposeless to some of those who look on.

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His favorite method of meteorological investigation was the map. Beginning from the time when the reduction of the barometer to sea level for synchronous charts and the identification of closed isobars as cyclonic and anticyclonic areas were novelties, he was the first to trace the course of a "depression" across the Atlantic, and subsequently, by the collection and discussion of data from all parts of the world, to give, in a paper before the Royal Society of Edinburgh, "the mean pressure of the atmosphere and the prevailing winds over the globe".

This was followed by the monthly charts and tables representing the atmospheric circulation in the volume contributed to the Challenger Reports and published in 1889, and the corresponding results for "oceanic circulation" in 1895.

His monthly maps of forty-year averages for the British Isles developed likewise (with the assistance of Dr. A. J. Herbertson) into the compilation of the wonderful atlas of pictorial meteorology published by Bartholomew, in 1899. Therein is, indeed, a worthy representation of Buchan's meteorological method.

It was by the method of the map that he proposed to deal with the outstanding results of the Ben Nevis observations, which were collected largely under his own supervision, and have been already the subject of

numerous papers. His capacity for dealing in this way with huge masses of figures was amazing. I have often gone with him over the details of daily maps exhibiting the results for Scottish weather at official stations, lighthouses, and private stations to trace some generalization which had been suggested by his work. His program was to correlate these daily maps with the observations at the summit and base of the mountain. The methodical care in ordering the entries, and their arrangement as regards color or design, to bring out any salient features, were thoroughly characteristic of his work.

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In thus taking leave of a kindly master and a valued friend, it is not too much to say that the work of Buchan's life has contributed largely to justify the claim of meteorology to be regarded as a separate scientific subject, entitled to separate academic recognition. The physics of the atmosphere has its geographical aspect, but it is not a branch of geography; it has its mathematical aspect, but it is not a branch of mathematics; it has its experimental aspect, but it is not a branch of experimental physics. The constitutional affection of the throat prevented Buchan from using his natural powers of exposition to their full extent, but may we not hope that the University of Edinburgh will see her way to recognize the devotion of her distinguished alumnus by providing the subject of his devotion with a voice among the sciences which she fosters?

RESOLUTIONS ADOPTED AT THE MILAN CONFERENCE FOR SCIENTIFIC AERONAUTICS.[1]

Translated by Prof. A. LAWRENCE ROTCH.

The following resolutions were adopted by the commission:

1. For the official publication, the observations should be formulated according to the rules adopted and indicated in the report of the president. It is necessary that all the small inversions of temperature should be noted.

2. (*a*) The commission, on the proposition of Mr. Teisserenc de Bort, realizing the great importance of collecting sufficient observations to construct charts of the meteorological elements at various heights under different atmospheric conditions, believes that its efforts should be concentrated upon four groups of ascensions annually, called "grand international ascensions", to distinguish them from the monthly ascensions. These last are optional for stations that do not make aerial soundings their chief work.

(*b*) The quarterly ascensions will be made during three consecutive days, on dates to be fixt hereafter.

(*c*) It is recommended that the trajectories of the sounding balloons shall be determined by sighting, and that the same thing be done for pilot balloons, if no sounding balloons are launched, as will be the case at insular stations; in any case the drift of the clouds must be observed with great care. The new series will commence in March, 1907.[2]

3. It is also desirable, as Mr. Rykatchef suggested, to have at least one temporary station for these international observations in the midst of the great Asiatic anticyclone, especially in winter. If this station can be established, observations in winter should last seven days instead of three—that is to say, two days before and two days after the three normal days.

4. To examine the proposition of Mr. Köppen, the conference appoints a subcommittee composed of Messrs. Berson, Hergesell, Köppen, de Quervain, Rotch, and Teisserenc de Bort, which proposes—

(*a*) To adopt the proposition of Mr. Köppen to publish a compendium of the best methods employed for aerial soundings. This compendium will describe the methods and instruments categorically, in a form analogous to that of a dictionary, and the various institutions conducting aerial soundings will be consulted as regards the final version. The publication will be made with the funds of the international commission applicable to the publication of observations.

(*b*) The same subcommittee examined the question relating to the statistical table of ascensions. The form adopted by the Deutsche Seewarte is recommended for the kites, and the institutions are requested to give annually a similar résumé for the balloons.

5. The commission votes its thanks to Messrs. Teisserenc de Bort and Rotch for their splendid researches in the atmosphere above the Atlantic Ocean, and to the Imperial Minister of Marine for the participation of the German Marine in the exploration of the high atmosphere. It listens with interest to the communications of Messrs. Köppen and Hergesell relating to the results of the cruise of the ship *Planet*, which is to advance further the conquest of these unknown regions, and sends a congratulatory dispatch to the Prince of Monaco for the explorations accomplished by his yacht, the *Princesse Alice*.

6. The commission expresses its thanks to the Spanish Minister of War for allowing the military aeronauts to cooperate in the work of the commission, and particularly for the interesting researches made during the eclipse of the sun on August 30, 1905.

7. The commission recognizes with great pleasure the institution of aerial soundings by the Weather Bureau of the United States at Mount Weather, and hopes that these soundings will be extended to other stations of the service.

8. The conference agrees with Major Moedebeck that it would be useful, both for scientific ascensions and for aeronautics in general, if, on the topographic maps of the States, there should be indicated in red the luminous points which can serve for orientation at night, and also if all lines of dangerous electric wires as well as the places most sheltered from the wind should be marked on the maps.

9. The commission accepts Mr. Assmann's propositions with these slight modifications:

(*a*) The commission shall meet but once in three years unless there be especial reasons for assembling oftener.

(*b*) The meetings will be for the purpose of discussing the organization of the work, the methods and instruments, and scientific communications will be presented only at the end of the meetings if time permits.

10. The proposition of Mr. von Bassus is adopted to add to the form containing the reduction of the ascensions of sounding balloons, another column headed "Wind", and having subheadings for "Direction" and "Velocity". The lines of these columns and also those of the columns "Gradient" and "Ventilation" are to be doubled. The notes at the foot of the second page will indicate that up to 3000 meters the reduction should be made for each 500 meters, and above 3000 meters that it should be for each 1000 meters. All inversions, isothermal strata, and sudden changes of wind and humidity are to be noted.

11. It is desirable that the negotiations be continued, looking to the establishment of a seal of the International Commission for Scientific Aeronautics.[3]

[1] See Monthly Weather Review, April, 1907, vol. XXXV, p. 181.

[2] Subsequently postponed until July.—*A. L. R.*

[3] This would insure the instruments entering the different countries without examination by customs officers.—*A. L. R.*

GUILBERT'S RULES FOR WEATHER PREDICTION.

By OLIVER L. FASSIG, Research Director. Dated Mount Weather Observatory, Bluemont, Va., November 2, 1906.

In earlier numbers of the REVIEW (November, 1904, and January, 1905)[1] were published two letters relating to a proposed international competition at Liège, organized by the Belgian Astronomical Society, in order to bring out the present state of the art of predicting the weather. This competition was attended by several experts, some of whom have published their methods in full in accordance with the requirements of the jury of awards. The paper presented by M. Gabriel Guilbert, of Caen, was dated September 28, 1905, and attracted the most attention, as it contained a principle of forecasting that had not been employed or announced before.

The jury, composed of six well-known meteorologists, of whom Mr. A. L. Rotch, of Blue Hill Observatory, was the

[1] Vol. XXXII, page 523, and vol. XXXIII, page 11.

American representative, unanimously awarded the first prize to Mr. Guilbert for the method which enabled him to predict with precision the displacements and variations of centers of high and low pressure over Europe. Depressions and high areas invisible on the weather map when interpreted by methods heretofore used, were predicted by Mr. Guilbert. The author claims to be able to forecast radical changes in the barometric situation, both as to the form and the movement of the centers of high and low areas, for twenty-four hours in advance, with a precision far above that afforded by present methods. Heretofore the forecaster has to a very large extent assumed that a depression already discernible upon the weather map would follow a path already indicated by its previous movement, and that it would follow this path with but slight modifications in form or intensity. It was only in rare cases that a forecast of the *formation* of a low or high area was attempted. According to the statements of Mr. Guilbert he is able by his method to foretell the *inception* and the *dissolution* of storms.

Guilbert's new method is based upon what he terms the principle of the *normal wind*. The normal wind is defined as a wind whose force is directly proportional to the barometric gradient. Thus, on a scale of 0 to 9, a light wind (force 2) is normal for a gradient of 1 mm. per geographical degree of 111 km.; a moderate wind (force 4) is normal for a gradient of 2 mm., etc. This scale is given more in detail in the following paragraphs.

Guilbert's rules have been summarized by M. Brunhes, the chairman of the jury of award, who has contributed a valuable theoretical discussion of the rules (see Archives des Sciences Physiques et Naturelles for July, 1906).

According to M. Brunhes, the three rules announced by Guilbert may be summarized as follows:

1. Every depression that gives birth to a wind stronger than the normal will fill up more or less rapidly. On the other hand, every depression that forms without giving rise to winds of corresponding force will deepen, and often depressions that are apparently feeble will be transformed into true storms.

2. When a depression is surrounded by winds having varying degrees of excess or deficiency, as compared with the normal wind, it moves toward the region of least resistances. These favorable areas are made up of regions in which the winds are relatively light, and especially of such as have divergent winds with respect to the center of the depression.

3. The rise of pressure takes place along a direction normal to the wind that is relatively too high, and it proceeds from right to left; an excessive wind causes a rise of pressure on its left.

The results attained by Mr. Guilbert in the international competition were so far superior to those of any of his competitors that his methods are worthy of the closest study. A translation is here given of the paper presented by the author in which his new method is worked out in detail. How far the successful forecasting of Mr. Guilbert in this competition was due to the principle announced and how much is to be attributed to the cumulative experience of the forecaster remains to be demonstrated. The rules can be readily put to the test of experience, and the paper of Mr. Guilbert should receive the careful consideration of all who make weather forecasts.

PRINCIPLES OF FORECASTING THE WEATHER.

By GABRIEL GUILBERT, of Caen. Dated Liège, Belgium, September 28, 1905. [Translated by O. L. Fassig.]

The method which we employ in forecasting the weather at short range is based on the principle of the *normal wind*.

The normal wind is that whose force is directly proportional to the barometric gradient.

In the scale of winds from 0 to 9, a *light* wind (force 2) is *normal* for a gradient of 1 mm. per geographic degree of 111 km.

A *moderate* wind (force 4) is normal for a gradient of 2 mm.

A *fresh* wind (force 6) is normal for a gradient of 3 mm.

A *high* wind (force 8) is normal for a gradient of 4 mm.

In departing from these proportional coefficients, the winds are abnormal either by *excess* or by *deficiency*. Thus, 3 will be abnormal by *excess* for a gradient of 1 mm. per degree; in like manner 5, 7, and 9, for gradients of 2, 3, and 4 mm., respectively:

Inversely a calm (0) will be *abnormal by deficiency* for a gradient of 1 mm.; similarly 3, 5, and 7, for gradients of 2, 3, and 4 mm., respectively.

We have cited anomalies of but small importance, but it is not rare in observations to find 7 with a gradient of 2 mm., 9 with 3 mm., and, inversely, 3 or 4 with a gradient of 3 mm.

As a result of this scale and this principle, high winds and even gales can be *abnormal by deficiency*, that is to say, relatively too light for the gradient considered; and, inversely, light or moderate winds may be *abnormal by excess* in considering the gradient referred to.

Of course, these coefficients of wind force are at present dependent upon the estimation of observers, and science will some day require anemometric measures; but, in the meantime, the approximate estimate of this velocity of the air at the surface of the earth, *and at the surface only*, is sufficient for making a forecast *twenty-four hours in advance* of variations of pressure, whether rising or falling.

We maintain that no depression can subsist unless there be as complete equilibrium as possible between the force of the wind which it causes and the gradient which it forms.

To produce this equilibrium the force of the wind must be proportional to the gradient; there is then equality between the *centripetal* and *centrifugal* forces which are in constant struggle in every barometric depression. The gradient represents the centrifugal force, the wind the centripetal force. If at any point of a cyclone one of the forces predominates, there is a change in the form of the cyclonic whirl.

This change will take place in the direction of extension if the centrifugal force represented by the gradient is greater than the relatively feeble force of the wind. If, on the contrary, it is the centripetal force, represented by the velocity of the wind, which is the stronger, the whirl will undergo a *reduction* more or less noticeable.

Consequently, in application, with a wind *abnormal by excess*, there will be a *rise in pressure*, generally *proportional to the excess* of the wind observed.

Inversely, with a wind *abnormal by deficiency*, there will be a *fall in pressure* directly proportional to the importance of the observed anomaly.

With a *normal* wind the variations in pressure will be *nil* or slight.

It follows from this law and these observations that the wind is in reality *the enemy of the depression;* that it is centripetal, in *conflict* with the centrifugal force represented by the gradient; that it has the power to fill up cyclonic storms and cause them to disappear.

Hence, every depression which gives rise to winds above the normal in force will fill itself up more or less rapidly, in whole or in part.

Depressions arriving from the ocean, which give rise to too high winds, can not advance, but remain stationary, or may even be forced back toward their place of origin.

Every depression which is completely surrounded by winds, *abnormal by excess*, will be filled up *in place* within twenty-four hours, often even in twelve hours; this is the phenomenon which we designate under the name of COMPRESSION OF THE CYCLONE.

On the contrary, every depression, which gives rise to a marked fall in pressure, without causing winds of correspond-

ing force, will deepen, and in consequence apparently feeble depressions are often transformed into true storms.

But the problem is not only to predict whether a depression will fill up or deepen; nor is it sufficient to indicate the extent to within a few millimeters of the variations of pressure in cyclones; it is also necessary, in order to make a more or less perfect forecast of the weather, to establish *the velocity and the path of the center of the depression*—things which no method of forecasting has, up to the present time, enabled us to determine.

The principle which guides us in this estimate—and which is only a consequence of the first—is thus exprest: *The depression moves toward the region of least resistance.*

These favorable areas will evidently be made up of zones where the winds are *proportionally* too light for the gradient, and, above all, of regions where the winds are *divergent* with reference to the center of the depression considered.

Hence, every barometric low which is prest on one side by winds *abnormal by excess* will move toward the region of least resistance; whether this region be to the north, to the south, to the east, even to the west of the center; and often *whatever may be the distance from the center to this region.* This is the explanation of the apparently capricious directions followed by certain tempests; and it is, at the same time, the basis for predicting the translation, sometimes to prodigious distances, of the centers of storms.

To summarize, in the principle of the *normal wind* we have a safe and rational basis, not only for predicting barometric variations, but for determining whether a depression will or will not assume importance; whether it will fill up or deepen; whether it will retrograde or advance rapidly along a path more or less regular. We can, in addition, establish with sufficient approximation, the region which ought to be covered by the center of the depression on the following day; hence these three problems of the *extent*, the *direction*, and the *velocity* of the motion of storms are completely solved.

This is not sufficient. It is of importance to establish the regions where the rise and fall of pressure will attain their *maximum* intensity. These maximum variations do not always correspond to the maximum and minimum pressures. It is in the region of *least resistance*—or where the winds are simply light—that we locate these oscillations (maximum rise or fall). But we wish to be still more precise and even indicate the stations which will record, on the following day, the maximum rise and fall within the twenty-four hours.

This problem, the most interesting of all perhaps, is solved by the aid of this hypothesis: *The air flows in a direction perpendicular and to the right of the wind which is proportionally too strong.* Therefore the maximum rise or fall takes place *in a straight line* in this direction [i. e., perpendicular to the excessive wind]. Consequently, if the *converging* winds bring the air, or at least the pressure, straight toward the center, *along the gradient*, normal to the isobars, and tend to fill up the center—just as if the cyclonic system were stationary and independent of the rotation of the earth—then the *diverging* winds operate in an opposite direction. Instead of concentrating the pressure they produce a dispersion, that is to say, a void, and this void *is a depression.* We approach here very closely the cause of the origin of cyclones. Moreover, the application of our principles and of our hypothesis to the examination of anticyclones enables us to forecast their formation and *their dissipation.*

As the movement of cyclones and of anticyclones determines in general the force and the direction of winds and nearly all the phenomena of heat or cold, of rain or fine weather, of cloudiness or humidity, the principle of the *normal wind*, with its natural consequences, *creates*, in the literal sense of the word, a new method of forecasting the weather.

It is immediately applicable to the synoptic charts, such as those of the Central Meteorological Bureau of France, without introducing any modification.

Certain progress will be the consequence of this application, as our principles are applicable at all times of the year, and the rare errors that occur in practise are due, not to the principles, but to the inexperience of the interpreter, or to the difficulties which result from the simultaneous occurrence of several depressions, or to the sudden arrival of storms from the ocean.

Clouds, or the *succession of clouds*, as we demonstrated in 1886, announce the approach of these oceanic depressions. Once upon the continent, they can be followed by our method. The art of weather forecasting, empirical up to the present time, without strict rules, and based upon an incommunicable personal experience, will then become scientifically established.

OBSERVATIONS OF HALOS AT COLUMBIA, MO.

By GEORGE REEDER, Section Director. Dated Columbia, Mo., May 21, 1907.

My observations of halos at Columbia, Mo., have been carefully made and recorded, and I have found that halos are a very good guide in predicting weather changes, especially the 22-degree circles. I have noted that when the 22-degree circle is observed precipitation usually occurs within twelve to eighteen hours, the storm center crossing the meridian near the point of observation. In such cases the upper clouds undergo rapid changes, becoming thick and matted as they change from cirro-stratus to alto-stratus. When the 45-degree circle is observed the storm center is usually from 800 to 1000 miles or more away and precedes precipitation, if any, by twenty-four to thirty-six hours. I have known the 45-degree circle to continue for three hours or more, with colors well defined, the cirro-stratus clouds being apparently of the most delicate texture and changing their form slowly. If the center of disturbance is directly west of the point of observation, or nearly so, the 45-degree circle may be taken as a very sure sign that precipitation will occur within the succeeding thirty-six hours at this station; but it frequently happens that the storm center crosses the meridian far to the south, and then precipitation does not occur at the point of observation. Well-defined 45-degree circles have been observed around the sun at this station when a West Indian hurricane was immediately off or near the east Gulf or South Atlantic States, but of course in such cases no precipitation occurred at the point of observation. A very brilliant solar halo on September 27, 1906, was the first indication that a Gulf storm was moving northward, entering the mainland near the mouth of the Mississippi River. The storm moved up the valley quite rapidly, and rain was falling over the greater part of Missouri just twelve hours after the halo was observed.

The following are the dates upon which halos were observed during the years 1905 and 1906. February, 1905, was abnormally cold and solar halos were unusually numerous:

January 5, 1905, 10 a. m., solar halo, 22°, bright for one hour. Snow on the 6th.

January 8, 1905, 9 a. m., solar halo, 22°, bright and well defined until 9:30 a. m., disappeared at 10 a. m. Snow began falling at 7:45 p. m. same day, continuing into the night.

January 14, 1905, 2:35 p. m., solar halo, 22°, not well defined, very faint in its lower half. Cold and clear on the 15th.

January 28, 1905, 12 noon, solar halo, 22°, well defined; continued until 2:30 p. m. Snow on the 29th.

February 1, 1905, 4 p. m., solar halo, 45°, brilliant. Cloudy and cold on the 2d; snow on the 3d.

February 7, 1905, 1 p. m., solar halo, 22°, well defined, lasting one hour. Snow began falling soon after 12 midnight and continued during the 8th.

February 10, 1905, 10 a. m., solar halo, 22°, exceptionally well defined, continuing until 12 noon; clouds changing from

cirro-stratus to alto-stratus. Snow began at 4 a. m. of the 11th, continuing thru the entire day.

February 12, 1905, snow continued during the night of the 11th and the greater part of the 12th; at 4 p. m. the sky cleared, showing a faint halo; at 4:30 p. m. a perfect parhelion was observed. Weather on the 13th cloudless and very cold; temperature 25° below zero.

February 18, 1905, 9 a. m., solar halo, 45°, very bright, lasting until 2:30 p. m. Increasing cloudiness after 3 p. m.; complete cloudiness at 4:30 p. m. A faint lunar halo was observed at 11 p. m. Snow began soon after 7 a. m. of the 19th, continuing during the day.

March 1, 1905, 10:30 a. m., solar halo, 45°, very bright, lasting until 12:30 p. m. The 2d opened with dense fog, followed by clear and pleasant weather.

March 4, 1905, 4 p. m., solar halo, 22°, faint; fading and reappearing until 5:25 p. m. Fair and pleasant on the 5th.

March 5, 1905, solar halo, 22°, bright and well defined, lasting until 12 noon. The morning of the 6th was cloudy and threatening; rain fell in the afternoon.

March 26, 1905, 2:15 p. m., solar halo, 22°, moderately well defined, lasting until 4:30 p. m. Thunder with showers on the 27th.

April 11, 1905, 4:30 p. m., solar halo, 22°, faint. Cool and cloudless next day.

April 22, 1905, 8:30 a. m., solar halo, 45°, lasting until 4 p. m., well defined, especially brilliant from 10 a. m. until 11:30 a. m. Unsettled weather on the 23d; rain and thunder during following night and next day, the 24th.

May 14, 1905, 7:45 p. m., lunar halo, 21°, quite well defined, lasting until 9:30 p. m. Thundershowers afternoon of the 15th.

May 18, 1905, 10 a. m., solar halo, 45°, very fine and bright, lasting until 2 p. m. At 9 p. m., lunar halo, 22°. Clear, with normal temperature on the 19th.

May 24, 1905, 9 a. m., solar halo, 45°, bright and well defined. Thundershowers on the 25th.

May 29, 1905, 11 a. m., solar halo, 22°, well defined, but lasting only a short time. Light rain the same afternoon and the next day.

June 14, 1905, 2 p. m., solar halo, 45°, well defined, Generally clear and warm on the 15th.

June 16, 1905, 2 p. m., solar halo, 22°. Weather unsettled on the 17th, but no rain.

September 14, 1905, 9 a. m., solar halo, 22°, lasting until noon; very bright and well developed. Showers late in the afternoon of the same day, continuing during the night and the next day.

October 13, 1905, 2:30 p. m., solar halo, 22°, bright; lunar halo at 8:15 p. m. 22°, bright. Thunderstorms and rain on the 14th.

December 8, 1905, 10 p. m., lunar halo, 45°, very bright and well defined. (Hurricane crossing Florida.) No rain on the 9th.

December 9, 1905, 2 p. m., solar halo, 45°, well defined. (Hurricane off South Atlantic coast.) Cloudless skies, with bracing, cool temperature on the 10th.

December 12, 1905, 3 p. m., solar halo, 45°, well defined. (Storm along Texas coast.) Weather clear on the 13th.

December 17, 1905, 11 a. m., solar halo, 45°, very fine. Weather generally clear on the 18th.

December 18, 1905, 8:30 a. m., solar halo, 45°, brilliant for half an hour. (Storm in Rio Grande Valley.) Cloudy on the 19th; rain and snow on the 20th.

December 30, 1905, 10 a. m., solar halo, 22°, pale. Light snow night of the 30th.

January 5, 1906, 12:30 p. m., solar halo, 22°, pale. Weather clear on the 6th.

January 18, 1906, 1:30 p. m., solar halo, 22°, pale. Fair next day.

January 19, 1906, 10 a. m., solar halo, 45°, well defined, lasting until 3 p. m. Rain soon after 12 midnight of the 20th.

January 20, 1906, 9 a. m., solar halo, 22°, lasting two hours; at times very bright and at others pale and indistinct, alternating. Rain soon after 12 midnight, changing to snow on the 21st.

January 29, 1906, 7:15 p. m., lunar halo, 22°, bright. Fine weather on the 30th.

February 11, 1906, 1:30 p. m., solar halo, 45°, bright and well defined. Cloudy on the 12th; rain and snow on the 13th.

February 16, 1906, 2:30 p. m., solar halo, 22°, bright. Light snow during most of the forenoon next day.

April 3, 1906, 10:19 a. m., solar halo, 45°, bright and well defined. Rain began 4 p. m. of the 4th.

June 1, 1906, 7:45 a. m., solar halo, 45°, bright and well defined. Weather next day mostly clear.

June 2, 1906, 10:35 a. m., solar halo, 22°. Unsettled with showers on the 3d.

September 27, 1906, 12 m., solar halo, 45°, very bright and well defined, lasting until 3 p. m., but becoming pale and ill-defined at about 2:30 p. m. Cloudiness increased rapidly during the afternoon, and rain began at 2:30 a. m. of the 28th. (A Gulf storm of marked energy was near the mouth of the Mississippi at 7 a. m. of the 27th. The morning of the 27th was cloudless at Columbia; cirrus appeared, moving from the SSE., at about 11:35 a. m., changing rapidly to cirro-stratus. Alto-stratus appeared at about 2:30 p. m., then cumulus, strato-cumulus, and stratus, all within the following three hours.)

OBSERVATIONS OF HALOS AND CORONAS IN ENGLAND.

By M. E. T. GHEURY. Dated Eltham, England, June 6, 1907.

Casual observers of halos and coronas can not realize how frequent these phenomena really are, as shown by the great number observed when they are made the object of systematic daily and nightly observations.

While I should have stated a few months ago, as an estimate of their probable number in these latitudes, that there might be yearly perhaps ten or so, taking as a basis my recollections of my observations of the previous years, a systematic inspection of the sky, begun this year, has yielded twice that number for the first quarter of the year only. They promise an interesting study both by the variable appearance of the phenomena themselves and by the different meteorological changes accompanying them. This number, however, may be quite exceptional; it is influenced by the age of the moon, since, in exactly similar favorable meteorological conditions, the presence or the absence of the moon above the horizon from nightfall to midnight will obviously make all the difference between such a phenomenon taking place or not.

On the other hand, one can not be always observing, and it is certain that a large number of phenomena are not recorded.

The present systematic observation was undertaken to ascertain if these phenomena—since their cause is purely an atmospheric one—could not be taken as the basis of forecasts of the approaching weather, and, incidentally, to test the theories brought forward by Prof. J. M. Pernter in his Meteorologische Optik, whenever they were displayed with sufficient brightness to lend themselves to accurate measurements with a sextant.

Before giving the results of the observations of the first quarter of this year, some remarks which were made in the course of these observations should be stated as a preliminary explanation of some of the observed phenomena.

Faint halos.—The observation of a faint halo requires great care and circumspection. A halo of that kind requires continuous attention to be discerned, especially when the sky is not uniformly veiled, as the halo may be but partly visible, and be lost amongst the bright patches of an irregularly

clouded sky. On the other hand the arrangement of the clouds may produce a milky patchiness having the position and the curvature a halo should have and extending along an arc of quite as much as 90°, so as to give a momentary appearance similar to a partial faint halo. Steady attention, however, will show that this milkiness changes in position with regard to the sun, altering the appearance to the usual irregular patches of greater transparency in the nebulous layers.

Annuli.—The most rudimentary form of corona is a patch of light closely surrounding the disk of the sun or the moon and extending, as a rule, to a distance from the limb equal to the full diameter of the disk. It is sometimes of the shape of an ellipse, with the major axis vertical, and in one case observed the ellipse seemed the rudiment of a "pillar" similar to those I have observed above the sun or the moon, the width of which was about equal to the diameter of the sun.[1]

It would be interesting to establish this connection between the central patch and the pillar; but, unfortunately, as a rule, the pillars show themselves when the sun is below the horizon or hidden by low banks of clouds, and it is then impossible to see the widening at the base where the pillar would assume the elliptic shape.

These patches are, I think, of special interest. I never saw them mentioned anywhere, yet they seem to be distinct and well-marked phenomena, as will be seen below. The edge is generally undefined, but, in some cases, when around the moon, it was so perfectly sharp as to lend itself to sextant measurements to within one minute of arc (see accompanying table, Nos. 5 and 13). This sharpness of the edge makes the denomination of "patch" quite misleading and inadequate, and I have therefore adopted the name of "annulus", with defined or undefined edge, in contradistinction with "corona", as measuring a ring detached from the disk. For the sun, this annulus is generally of a brownish red, like transparent smoke; this is the color I find also on the inner edge of halos or on the outer edge of coronas, and it is probably due to the overlapping of the colors of the red end of the spectrum. This is a further support to the claim of these annuli to rank as distinct phenomena in meteorological optics.

Measurements.—The unit chosen in estimating the dimensions of the phenomena is the diameter of the disk. It is practically the same for both the sun and the moon, approximately constant, and about 30′, or half a degree.

Measurements with a sextant are difficult. A sextant with a very large mirror is required, and the measurement should be repeated two or three times, moving the index after each reading so as to be sure one has a fairly accurate observation, as shown by the agreement of the readings. For halos and coronas, which have an indistinct edge, half a degree has been so far the greatest accuracy possible. An annulus has however been measured to the nearest minute.

The best method—available only for the moon, and this in exceptional circumstances—of ascertaining accurately the dimensions of halos, coronas, and annuli is to note any star which occupies such a position as to enable the dimensions to be calculated from the coordinates of the moon at the time of observation and those of the star. Two stars are enough for the determination of the radius and of the width of a halo, if they are situated one on the inner side, the other on the outer side of the halo, just on the edge, but not necessarily on the same radius if we assume the width to be uniform. It will be realized that such a disposition, altho possible, must be rare, if we remember that the stars visible during moonlight are few, the more so in the veiled sky which is ordinarily an accompaniment of halos; and when they are visible they are as a rule anywhere but where they should be, to be of any use.

[1] See Bulletin de la Société Astronomique de France, 1900, p. 509 and 524; 1905, p. 264; 1907, p. 21; also No. 3 in the accompanying table.

One star exactly on the edge (inner or outer) or exactly between the two edges would, however, give the radius (inner, outer, or mean) with great exactitude, as the edges are sharper to the naked eye than when observed in the mirror of a sextant, and therefore lend themselves to more accurate delineation.

The writer will be much obliged if anyone making an observation of this nature would send him full particulars[2] (name of the star, position with regard to the halo, and time of observation). The star should be, as mentioned above, exactly on one of the edges or midway between them. It is worth while, sometimes, when the halo is of a permanent nature, to wait till the motion of the moon brings the halo into exactly the proper position.

Observations.—The observations have been tabulated as follows:

Column 1. Number of the observed phenomenon.

Column 2. Date and hour.

Column 3. Nature of the phenomenon: Halo (single or double), corona, annulus or pillar. S.=sun; M.=moon. Rainbows are also recorded, but without the accompanying meteorological observations.

Columns 4 and 5. The minimum and maximum temperatures, in degrees centigrade, during the twenty-four hours preceding the phenomenon.

Column 6. Mean barometer during the twenty-four hours preceding the observation, from seven values from the curve plotted from readings taken at various times of the day. If continually rising or falling during this time, it is indicated by "rising" or "falling" from — to — (thus giving the mean rate of fall or rise during twenty-four hours). If the rate of change alters in sign, it is indicated as "variable"; while if the amplitude of variation is less than 0.05 inches it is indicated as "steady".

Columns 7, 8, and 9. Minimum and maximum temperatures and mean barometer during the twenty-four hours following the observation.

Column 10. Weather at time of observation.

Column 11. Sequence of weather during the following twenty-four hours. If worth mentioning, the weather occurring in the second period of twenty-four hours is stated within brackets.

Column 12. Detailed description of the phenomenon. When observed to last but a moment, it is recorded as "transient".

DEDUCTIONS.

Annuli.—Six observed.

Sun, 2. One followed by rain, one by stormy weather without rain.

Moon, 4. One followed by snow, two by wind and rain, one by fog.

Coronas.—Six observed.

Sun, 1. Followed by wind and rain.

Moon, 5. One followed by wind and rain, one by fog, one by wind and snow, two by relatively fine weather.

Halos (single or double).—Nine observed.

Sun, 8. Three followed by wind and rain or snow, three by fog, one by rain, one by stormy weather without rain.

Moon, 1. Followed by fog.

Pillars.—One observed on the moon, followed by wind and rain.

Minima.—Of fourteen double minima of temperature observed, in ten sets the second is higher.

Maxima.—Of fifteen double maxima of temperature observed, in eight sets the second is higher.

Mean barometer.—Of seventeen double values, eleven indicate a lowering of pressure after the phenomenon.

GENERAL REMARKS.

Altogether, on nineteen distinct displays (rejecting the three

[2] Address: care of the Royal Astronomical Society of London.

No.	Date and time of day. 1907.	Nature of phenomenon.	Previous minimum.	Previous maximum.	Mean barometer for preceding 24 hours.	Following minimum.	Following maximum.	Mean barometer for following 24 hours.	Weather at time of observation.	Weather during following 24 hours.	Description of phenomenon and general remarks.
1	2	3	4	5	6	7	8	9	10	11	12
			° C.	° C.	Inches.	° C.	° C.	Inches.			
1	Jan. 4, 8 p. m.	Corona, M...	0.0	4.0	29.84, rising from 29.45 to 30.12.	0.2	9.0	30.10, falling from 30.12 to 30.02.	Fine, windy, frosty, passing clouds.	Warm, gray, misty..	Extending to 4 d. from limb. Reddish edge.
2	Jan. 27, 8 p. m.	Corona, M...	−4.9	4.4	30.10, falling from 30.22 to 29.94.	3.3	9.4	29.67, falling from 29.94 to 29.58.	Fine, cold, windy, passing clouds.	Fine and windy; stormy and rain.	Extending from 6 d. to limb. Edge strongly red.
3	Jan. 29, 6 p. m.	Pillar, M....	2.7	5.8	29.39, variable.....	0.9	4.9	29.43, rising from 29.28 to 29.70.	Fine, cold, windy, passing clouds.	Gale, with a squall of snow.	Same width as the disk, height 5 to 6 d. Moon just hidden by crest of low, black clouds.
4	Jan. 29, 10 p. m.	Corona, M. .	2.7	5.8	29.36, variable.....	0.9	4.9	29.59, rising from 29.28 to 29.75.	Fine, cold, windy, passing clouds.	Gale, with a squall of snow.	Up to 6 d. from limb. Outer third reddish.
5	Feb. 2, 12 p. m.	Annulus, M.	−0.8	3.0	30.10, rising from 30.02 to 30.20.	−1.4	2.3	30.23, variable.....	Fine, still, frosty, very pure sky.	Overcast, misty, a few flakes of snow (powdered snow).	One ring colorless, with sharp red edge, width 1 d. One moment a second round it, same width, much paler; then a third, very faint, same width, round the two others.
6	Feb. 10, 2 p. m.	Halo, S......	−0.1	7.5	29.56, variable.....	2.1	5.3	29.45, variable.....	Fine, warm, light wind, passing clouds.	Pouring rain, stormy snow (wet all day).	Halo of 22°. Sextant measure: 22° 30′ from center of disk to middle of band. Inner edge red; lasted 2 hours.
7	Feb. 14, 3 p. m.	Halo and annulus, S.	1.3	6.0	29.60, rising from 29.40 to 29.95.	3.9	9.5	29.88, falling from 29.95 to 29.78.	Fine, warm, light wind, veiled sky.	Gray and still; rain.	Halo of 22°, indistinct, upper half only visible, inner edge slightly red. Sun in reddish ("smoky") patch. Transient.
8	Feb. 16, 2 p. m.	Halo and annulus, S.	*	*	29.78, variable.....	4.8	10.7	29.85, variable.....	Fine, warm, windy, veiled sky.	Overcast, stormy. ..	Very indistinct halo of 22°, upper half only visible. Sun in reddish ("smoky") patch.
9	Feb. 16, 8 p. m.	Annulus, M.	*	*	29.80, variable.....	4.8	10.7	29.85, variable.....	Fine, warm, still, overcast.	Overcast, stormy, a little rain.	Radius about 1 d. Center at center of crescent moon, undefined edge.
10	Feb. 19, noon.	Halo, S......	4.3	9.5	29.64, variable.....	0.7	10.0	29.05, falling from 29.56 to 28.86.	Cloudy, very windy.	Stormy, pouring rain, gale, squalls of wind and rain.	Halo of 22°, inner edge reddish, outer edge bluish.
11	Feb. 25, 11 p. m.	Corona, M...	3.6	9.3	30.03, rising from 29.93 to 80.13.	5.2	6.7	30.14, rising from 30.13 to 30.19.	Overcast, gray, light wind.	Overcast, yellow fog.	Up to 6 d. indistinct, outer edge reddish.
12	Feb. 28, 3 p. m.	Double halo, S.	0.4	9.4	30.29, variable.....	0.9	11.5	30.23, falling from 30.30 to 30.15.	Fine, still, warm....	Thick white fog; fine, still, warm.	Inner halo faint, outer very faint. Sun's altitude 10°.
13	Feb. 28, 9 p. m.	Halo and annulus, M.	0.4	9.4	30.29, variable	0.9	11.5	30.21, falling from 30.26 to 30.15.	Fine, still..........	Thick white fog; still, warm.	Well defined halo of 22°. Sextant measurement, 22° 30′; width about 2 d. Inner edge distinctly red; lasted two hours. Annulus with sharp edge; width, by sextant, 6′ from limb; round this a second faint annulus up to 1 d. from limb.
14	Mar. 1, 2 p. m.	Halo, S......	0.9	11.5	30.27, falling from 30.31 to 30.21.	2.3	8.8	30.14, falling from 30.20 to 30.08.	Fine, sunny, warm, still.	Overcast, yellow fog; still and warm.	Part of halo of 22°.
15	Mar. 12, 1 p. m.	Corona, S...	−3.1	4.4	30.28, variable.....	4.5	6.5	29.93, falling from 30.15 to 29.78.	Fine, sunny, still...	Overcast, rain, strong wind.	Up to 6 d.; width about 1 d.; outer edge red. No halo.
16	Mar. 12, 3 p. m.	Halo, S.....	−3.1	6.5	30.19, variable....	4.5	9.3	29.90, falling from 30.11 to 29.75.	Fine, sunny, still...	Overcast, rain, strong wind.	Halo of 22°, whitish; corona gone.
17	Mar. 19, 10 p. m.	Annulus, M.	†	12.1	29.63, variable.....	†	11.9	29.95, rising from 29.77 to 30.22.	Fine, sunny, fresh gale.	Fine, sunny, strong wind, rain.	With undefined edge; width about 1 d.
18	Mar. 21, 10 p. m.	Corona, M...	1.2	13.3	30.21, variable.....	3.3	13.3	30.13, variable.....	Fine, still..........	Fine, light wind, overcast.	Inner edge to 4 d., outer edge 5½ d.; reddish, transient.
19	Mar. 25, 9 a. m.	Halo, S......	2.3	12.7	30.14. steady	3.5	13.6	30.15, variable.....	Fine, sunny, still ..	Yellow fog, fine, still.	Halo of 22°, inner edge reddish.

* Gradual cooling since the maximum, 9.5°, of the 15th. † Index displaced by vibrations. d. = diameter.

annuli, Nos. 7, 8, and 13, as occurring simultaneously with halos), we have—

Followed by thick fog, 5.
Followed by strong wind without rain or snow, 1.
Followed by rain alone, 1.
Followed by snow alone, 1.
Followed by strong wind, with rain, or snow, or both, 9.
Followed by relatively fine weather, 2.

The four kinds of phenomena, annuli, coronas, halos, and pillars, seem, all of them, to indicate approaching disturbances, seventeen out of nineteen being followed by strong wind or rain, or snow, or fog, or several of these combined. The two failures are both coronas of the moon.

THE RELATION OF THE MOVEMENTS OF THE HIGH CLOUDS TO CYCLONES IN THE WEST INDIES.

By JOHN T. QUIN. Dated St. Croix, Danish West Indies, March 9, 1907.

In June, 1898, the Weather Bureau published at Washington, in pamphlet form, a valuable paper on West Indian hurricanes, which had been prepared by the late Father Viñes, of Havana, for presentation at the Meteorological Congress at Chicago in August, 1893.

In this very instructive paper Father Viñes lays down the theory that, while the lowest air currents in a cyclone tend inward toward the center, the higher currents become more and more divergent as we ascend, until at the level of the cirrus clouds they move in "a completely divergent radial direction". On the last-named point he is very explicit; he says, for example: "If the vortex lies to the south-southeast, the cirrus clouds will move from the south-southeast". Again, on page 18 of the pamphlet, he speaks of a hurricane in September, 1875, the vortex of which, on the afternoon of the 12th, was over the western part of Haiti, 550 miles east-southeast of Havana, and he says that it was from this direction that the cirrus clouds were coming. Hence, there is no possibility of mistaking his meaning; the cirrus clouds, he means, come straight away from the vortex of the cyclone, even tho that vortex be at so great a distance as 550 miles.

But when we give careful attention to this statement we are confronted with the well-known law that the air currents in the Northern Hemisphere, while moving forward, tend to curve to the right on account of the earth's rotation. The volume of air which is supposed to rise from the center of the storm ought, therefore, to flow outward, not in straight lines, but in curved lines, the direction of which, at any given point of observation, would thus come to indicate, not the position of the vortex from which the stream of air had come, but that of a point to the right of the vortex. This point, it is true, might not be far to the right at a comparatively short distance; but as the distance of the vortex from the observer increased, the divergence would increase likewise, till at last the cirrus clouds might come to be moving from a point very far away from the direction in which the storm center lay. Does this law, then, show itself in the movements of the high clouds from a cyclone center, or is it counteracted, or are its effects greatly modified, by the surrounding conditions, so that Father Viñes's statement still remains correct?

We believe that in the case of the trade wind, with which we

in the West Indies are so familiar, the action of the law in question is greatly modified by the surrounding conditions, such as the positions of the continents, the change of seasons, and so on, and it may possibly be the same in the case of our hurricanes. It would seem, therefore, that the best way, perhaps indeed the only way, to settle the question would be by observation. If we could get a bird's-eye view of the ocean area over which the influence of a given cyclone extended, we could soon elucidate the matter; but as we can make our observations only from the earth's surface, extensive cooperation is needed to get at the facts. On the one hand we have to observe the motions of the high clouds, and on the other hand we have to trace the course of the storm center presumed to have some connection with those movements, and when both sets of data have been obtained they can be compared; and it can be seen whether the high clouds come from the center of the storm, or, if not, whether they stand in any other definite relation to such center.

In regard to the direction of movement of the cirrus clouds, it may be remarked that this is easily ascertained when the clouds are numerous and are scattered over the sky. The radiating point can then, with a little patience, be found with certainty, and an entry be made accordingly; but if the cirrus clouds are confined to a part of the sky, far from their radiating point, this latter can be obtained only with a rough approach to accuracy, and the entry concerning the movement has to be made with such qualifying remarks as to considerably reduce its value. The observations noted in the present article were made in the Danish West Indian Island of St. Croix, with as much care as the limited time at the disposal of the writer permitted; and they have been compared with the known tracks of several cyclones, two of the comparisons being also shown in figs. 1 and 2.

The observation of the high cloud movements over any given point is, then, a comparatively easy task, but we have to get the facts about the tracks of the storms before we can make any comparisons, and it is here that the real difficulty arises. After obtaining the first set of data we are often brought to a standstill by the impossibility of getting the second. Occasionally the storm center passes near enough to enable us to estimate, roughly, a part of its course, but sometimes even this is impossible; and most frequently it happens that we have to watch for the chance of seeing newspaper notices, or for the arrival of a ship which has crost the track, before we can get even a few scanty facts for the needful comparison.

It must be seldom, indeed, that the amateur who is waiting for light on his observations is fortunate enough to meet with so lucid a description of the character and course of a cyclone as that which Mr. Page gives of the hurricane of October, 1905, in the MONTHLY WEATHER REVIEW for January, 1906.[1] That great storm had a special interest for us in St. Croix, because the Quebec line steamer *Fontabelle*, from New York for St. Croix, with several passengers for the Danish Islands on board, fell in with it on the 7th, and was in the outskirts of it up to midday on Sunday, the 8th. The gale commenced from the east at 10 a. m. on the 7th, barometer 29.94; at noon the barometer had fallen to 29.85, and later is described as steady at 29.75. At midnight on Saturday the gale was estimated as blowing at the velocity of 65 miles an hour. The steamer was lying to, heading east the whole time, with tremendous seas running. Her position after the storm had past was latitude 29° 30′, longitude 68° 29′. The persistence of the easterly wind was very remarkable, and led many people here to believe, notwithstanding the fall in the barometer, that the storm was not of a cyclonic character. We now know that it was; and the persistence of the east wind may perhaps be explained from the storm's having had an elongated area, as shown in Mr. Page's synoptic charts of its position on the 9th, 10th 11th, and 12th. In those charts the elongation, it is true, lies northeast and southwest, so that to make the explanation complete we should have to suppose that the longer axis had changed its position from that which it had on the 8th, for which date no chart is given. This great storm later became of world-wide interest from the fact that one of its gigantic waves came over the deck of the big liner *Campania* and washt five of her passengers into the sea, from which the storm prevented any attempt to rescue them.

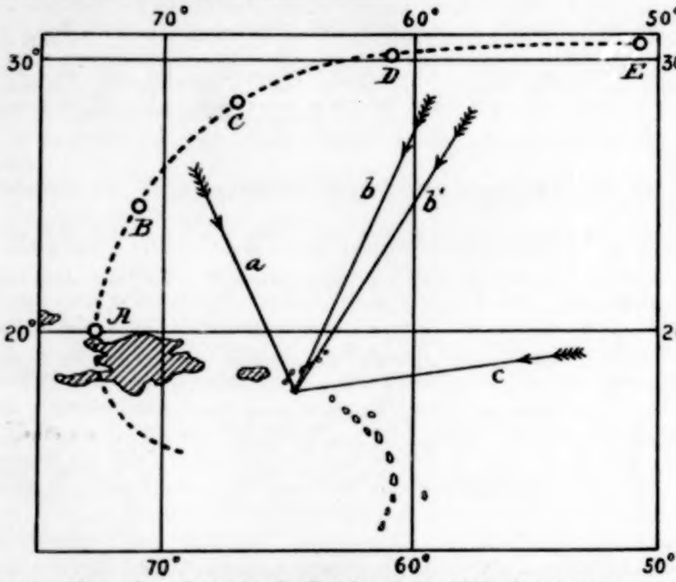


FIG. 1.—Map of cyclone track, October 6–10, 1905, showing direction of movement of high clouds observed at St. Croix.

In fig. 1 the large islands of Haiti and Porto Rico are shown, also the chain of small islands shutting in the Caribbean Sea; the course of the cyclone center is shown by the dotted curved line, the positions *A*, *D*, *E*, being taken from Mr. Page's data, *B* and *C* being inserted as rough approximations by the present writer. The arrow lines centering in St. Croix show the successive directions of the high clouds as they past over the place. It will, therefore, be understood that these arrow lines do not show the *course* of the high clouds, but only the direction which they had when moving over St. Croix. To facilitate comparison the successive positions have been marked with capital letters, and the corresponding high cloud directions with small letters. The position of the center on the 6th is marked *A*, and the cirrus clouds were noted on the morning of this day as coming from north-northwest (see *a*). The position *B* (approximate) on the 7th corresponds to *b*, "cirrus at 7 a. m. from north-northeast", and *b′*, "cirro-stratus at 5 p. m. from northeast by north". The position *C* (approximate) on the 8th corresponds to *c*, "cirro-stratus from east by north; about same direction all day". The distance of the position *A* from St. Croix is nearly 500 miles, of *B* between 500 and 600, of *C* over 700, and of *D* over 800 miles. No cirrus clouds were seen by the writer on the 9th, when the storm center was at *D*, possibly because that center was then too far away; yet this is doubtful, for it will appear probable from the next case to be examined that the movements of these high clouds are at all events sometimes influenced by the cyclone center at a much greater distance than 800 miles.

The case referred to is the cyclone of the early part of September, 1906. The course of the center, as shown in fig. 2, is roughly copied from the chart accompanying Professor Garriott's paper on "The West Indian hurricanes of September, 1906", in the MONTHLY WEATHER REVIEW for that month.[2] The successive positions of the vortex have been marked with their dates, as also have the arrow lines, which give the

[1] Vol. XXXIV, pages 1-7.

[2] Vol. XXXIV, pages 416-423, and Chart IX.

direction of the high clouds on the corresponding days. It will be seen that on the 30th and 31st of August, when the center was probably far out in the Atlantic, the direction of the cirrus clouds was from south-southeast. This was first seen at 5 p. m. on the 30th, and on the following day a note was made that cirrus was "rather abundant from south-southeast". The next morning (September 1) it is noted "9:50, cirrus abundant toward the north, moving from about east-southeast". On September 2, the sky was covered with low clouds, which gave no opportunity of seeing what was going on above; but on the 3d it is noted, "cirrus seen in abundance, but direction difficult to ascertain—about from north-northwest".

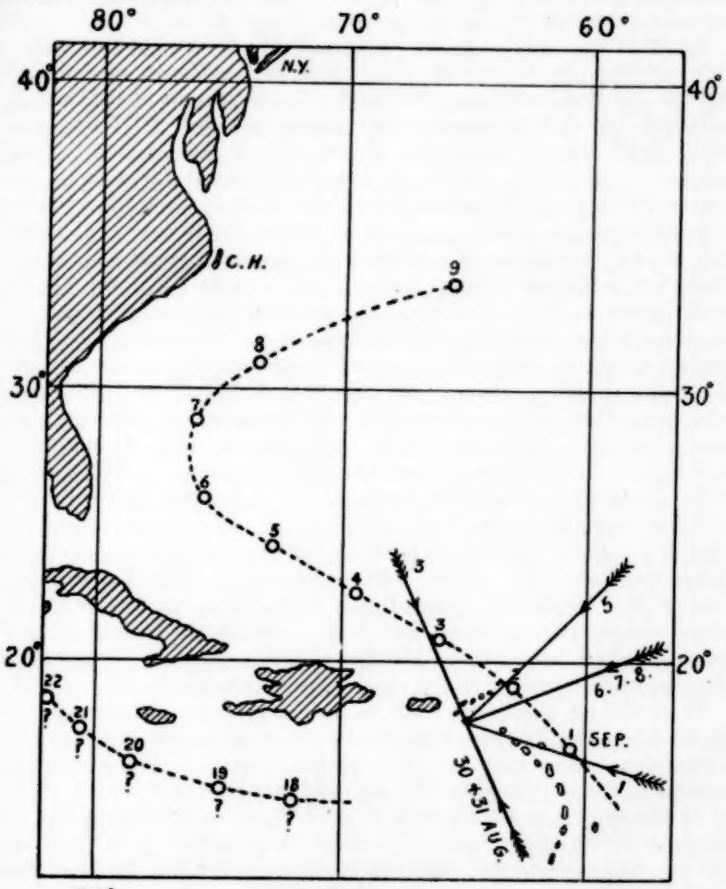


Fig. 2.—Map of cyclone tracks, August and September, 1906, showing direction of movement of high clouds observed at St. Croix.

On the 5th the direction had fallen back to northeast, and on the 6th to east-northeast, from which point the cirrus clouds continued to move on the 7th and 8th, on which last day it is noted that "light cirrus from east-northeast was seen all day". The center was then apparently about 1000 miles from St. Croix, and was moving farther away. The next day (the 9th) it is noted that "no cirrus was seen all day". The track of the storm of September 1–9, 1906, differs from that of October, 1905, in several respects, but notably in this, that the later storm past much nearer to these Danish Islands than the earlier one; and it will be seen that when it came comparatively near to the islands the clouds came from a point near the vortex, whereas when it was far distant, both before and after its passage, there was a considerable angle between the directions of the center and the direction of the arriving cirrus clouds. This was particularly marked after the passage, when the cirrus movements followed the vortex round, so to speak, to the position 3, and then as the vortex moved farther away to the northwest, fell back first to line 5 and then farther back to 6, 7, and 8.

So far as the above two examples are concerned it looks as if there was an undoubted connection between the movements of the storm centers and the cirrus clouds, and that this connection comes under definite law, and we shall perhaps not be wrong in supposing that this law is the one which was mentioned in the first part of this article as confronting us when we came to consider Father Viñes's theory, that the cirrus clouds always come straight from the storm center, irrespective of distance.

It was mentioned above that on the 9th of September, after the passage of the cyclone just considered, no cirrus was visible all day; but after that a very interesting thing happened. On the evening of the 10th, at 6 o'clock, light cirrus was seen moving from some easterly point; but it was so far away to the south that its direction could not be more nearly determined. The next day (11th) it is noted that light cirrus was abundant all day and that the direction, as tested at 6 p. m., was from east by south. On the 12th it was from east-northeast and continued around this point to the 17th—that is to say, this deviation of the cirrus from the normal lasted seven days and this, too, following close on a similar period. A friend to whom I spoke of these observations remarked that such persistence of the high cloud motion from the east was very extraordinary, to which I answered that either there had been a second cyclone passing us on the north, or else we must look for some other cause for some at least of the departures of the cirrus movements from the normal. Time past, however, and no solution came until Mr. J. Lightbourn, editor of the St. Thomas Mail Notes, handed me some clippings which he had been kind enough to save for me; and among them was the following from the Demerara Argosy of September 12, 1906:

Yesterday, the Liverpool line steamer *Frednes* steamed into port after a voyage of nearly twenty days from Liverpool. The steamer encountered squally weather and strong westerly and southwesterly head winds, north and south of the Azores for about three days. The trade winds were boisterous and squally and heavy rain fell continuously. On September 7, when the steamer was in latitude 16° 50′ N. and longitude 47° 45′ W., a very peculiar phenomenon was observed. The trade winds, which were at that time blowing strongly, suddenly veered round, first to the west and then to the southwest, and increased in force, accompanied by tremendous rain showers. The glass fell nearly half-an-inch and preparations were at once made on board the steamer for a hurricane, but fortunately no hurricane came. From the observations made by Captain Knudson, it was determined that the hurricane was raging to the northwest of the vessel and about 500 miles to the northeast of the West Indian Islands. The hurricane, as far as could be judged from the steamer, lasted for three days, at the end of which time the barometer rose.

Altho the above extract is somewhat obscure, it seems that the *Frednes* was actually on the southern side of a cyclone. It does not appear on which day its center was supposed to be about 500 miles to the northeast of the West Indian Islands; but the cirrus movement over St. Croix from east by south on the evening of the 10th suggests that it was then beginning to influence the high clouds passing over this island, and the subsequent movements of these clouds seemed to show that it took its way across the ocean north of these Danish Islands till the 17th, when for some reason or other its influence ceased. It is curious to note that this is the very day on which a storm coming off the ocean struck Georgetown, S. C., and if Professor Garriott had not in his chart indicated the probable origin of this storm in the Caribbean, I should have been tempted to believe that it was the same as that met by the *Frednes.* No further tidings of the latter storm, however, have reached me, and to say that the movements of the high clouds over St. Croix at that time do not confirm the professor's view, would only be to beg the question which is here under discussion.

We now come to the great Pensacola storm, of which a full account, illustrated by photographs, is given in the article above referred to. This unusually destructive storm came out of the Caribbean thru the Yucatan Channel on the 23d of September, and then crost the Gulf, striking Mobile and Pensa-

cola on the 27th. Its probable course in the Caribbean from the 18th to the 22d is shown in fig. 2, copied from part of Chart IX of the September MONTHLY WEATHER REVIEW. Now it is remarkable, in connection with our present subject, that the high clouds, which, as already stated, had been coming from the east-northeast down to the 17th, came from the northwest on the morning of the 18th. Dense clouds prevented observation of the high clouds on the 19th, but they were again seen to have the direction from the northwest on the 20th and 21st, which, after our study of fig. 1, is just what we might look for in St. Croix with a storm center in the middle of the Caribbean. The further passage of the Pensacola storm was not shown by high cloud movements here; on the 22d the movement was from the southwest, on the 23d from the west-southwest, and for the six following days it continued around these points.

Lastly, we may compare the high cloud movements at St. Croix with the course of the great Central American-Cuban cyclone of October last year. These clouds, which had been coming for several days from the west and southwest, were found early on the morning of the 18th to be moving from the northwest. The same afternoon came the telegrams announcing the great gale near Havana on the 17th. Later news told us of its destructive effects among the Florida islands, then at Miami, whence, as we were told by telegrams, the center had moved off to the *northwest*. If this last statement is correct, the present example has only this value, that it shows that some other causes must have been at work to produce the deviation of the high clouds now to be mentioned. On the 19th they were moving from the north; on the 20th, at 7 a. m., from north-northeast; on the same day at 5 p. m. again from north; and on the 21st from east-northeast. The direction on the 22d was not ascertained, but on the morning of the 23d they moved from east with extreme slowness, later in the day from northeast or east-northeast; on the morning of the 24th slowly from an easterly point, but at noon slowly from north, at 6 p. m. slowly from about west. Thus the abnormal movement ended on the 24th. It would be very interesting to know where the cyclone was during that time. Was the telegram correct, or was *northwest* put for *northeast?* I should think it likely that there was a mistake, the truth being that the vortex crost Florida and continued its course on the Atlantic far to the north of these Danish Islands, and that the high cloud movements followed this vortex around, as in October, 1905.

If it proves to be likely that there was a connection between the cirrus clouds and the cyclone in the above last-named case, then this connection existed at a distance of about 1200 miles, the distance between St. Croix and Havana. That would be a very striking fact if we could establish it.

Without including any doubtful cases, it seems to be made pretty certain, from the first two cases dealt with in this article, that the direction of the high clouds within the influence of a cyclone depends on the distance of the cyclone center from the observer. Father Viñes, himself, noticed that his theory about the varied direction did not always hold good, but he styles the departure from his theory an irregularity, and ascribes it to a cause which, in the opinion of the present writer, is non-existent. He writes, on page 12 of the pamphlet: "As the cyclone moves off to the north of the Tropics and is converted into a cyclone of middle latitudes, the currents gradually lose their regularity, altho their gradation continues the same. Sometimes, however, the movements of cirrus clouds present great irregularities; thus, for example, when the vortex lies to the northwest or north-northwest in the Gulf States, the current of the cirrus clouds is apt to suddenly come from the northeast. In such a case, I believe that the current observed is a resultant of the superior current of the cyclone acting together with the superior general current which at that time of the year comes from the eastern quarter."

Is it true that the upper current moves during the hurricane season from an eastern quarter? I think not, having never seen any good evidence for it. Here, in the eastern Caribbean, the evidence, so far, seems to hint that it may ultimately be possible to show that the upper current moves at all times from a westerly point, unless disturbed by a cyclone or some other special cause. This is probably the case, not only over these islands to the windward, but at Havana also. In a former number of the REVIEW Mr. Page, speaking of the high cloud movements at the latter place, mentions the different directions of cirrus clouds there, and, if I remember correctly, the proportion of normal movements (from westerly points) is large, if not even in excess of the movements from easterly points.

In the above nothing has been said about the rate of movement of the cirrus clouds, but this is evidently an important factor. If, for example, the high clouds whose direction is noted in fig. 1 took twenty-four hours to reach St. Croix, say from position *A*, then the arrow line *b* and not *a* would answer to *A*. It is probable, however, that the distances are traversed in a much shorter time. It is very difficult to form a conception of what a cyclone is really like; but if it turns out to be true that the outflowing upper current can make itself felt a thousand miles away, then it must leave the center with immense force and speed. Occasionally we come across an observation which confirms this view; for example, in Mr. Page's account, referred to in the beginning of this article, we read in the notice from the Chief Officer of the *Texan*, which was bound from Liverpool to Jamaica, and fell in with the great storm on October 9, and came to the "immediate outskirts of the vortex" on the 10th, that "the 9th set in with a moderate southwesterly wind, a northerly swell, and weather exceptionally clear and fine, the sky being cloudless save for *rapidly forming long cirrus feathers passing quickly across from west-northwest*". We can only guess what the starting rate is, and of course it gradually falls off, so as finally to become comparatively slow; but it is probable that we shall not have to allow much time for the progress of the clouds when the distance is only four or five hundred miles.

It would no doubt be rash to say that every divergence of these high clouds from a westerly point of origin is caused by a cyclone; there may be other causes. During the hurricane season last year (August, September, and October, 1906), eight such divergences were noted here. They were August 12–14; August 17; August 26; August 30–September 8; September 10–17; September 30; October 8–10, and October 18–24. The dates are mentioned here so that readers who know something about the cyclonic movements in this part of the world last year may get our side of the matter for a first rough comparison, if they care to make it.

Deviations of the high clouds from the westerly point of origin seem to be very rare outside the hurricane season. I will mention, however, one which was observed here on November 10, 1905. From the early morning of that day till about midday, well characterized cirrus clouds, mostly small, but some of considerable size and feathery, were moving at a moderate rate from southeast by east. Remembering the great distance to which it seems possible for a cyclone to send a stream of high air, we must admit that these clouds *may have come* from a point far out over the Atlantic toward the northeast. Was there such a cyclone there? Was it the same as the great storm which met the *Atrato* on the morning of the 11th and broke over the southern coast of England on the 12th? It would be very interesting, from the point of view of the present article, to know the history of that cyclone.

HAILSTORM AT CORPUS CHRISTI, TEXAS.

By JOSEPH L. CLINE. Dated Corpus Christi, Tex., June 1, 1907.

A hailstorm visited this place Friday, May 31, 1907, during

the progress of a thunderstorm. Thunder was first heard at 3:28 p. m.,[1] and last at 5:42 p. m. During this interval there were two distinct storms; both came from the west and moved toward the east. The first past to the south with no rainfall at this station, and before it was beyond the range of hearing the second came up and past just north of the station, causing rain from 4:44 to 5:02 p. m., amounting to .57 inch, most of which fell between 4:50 and 4:59 p. m. Hailstones of various sizes began falling at 4:38 p. m. (six minutes before the rain began) and ended at 4:54 p. m. All hailstones were flat and elongated, with sharp edges. Many were three-fourths of an inch in diameter the longest way. Some that were examined closely were frozen solid, with crystal ice at center, while the nuclei of others were amorphous ice. A few were found with holes thru them at the center on the flat side, having a shape like an elongated ring or hollow doughnut. It is believed that this form was due to the center being water, or raindrops, that were liberated by the melting of the sides of the hailstones when exposed to a temperature above freezing. Some of the largest hailstones had water, apparently fair-sized raindrops, in the center, while they were frozen solid on the outside, indicating that they froze after the formation of raindrops, and were not subjected to freezing temperature long enough to cause them to become solid ice. Only a few of the nuclei of those examined contained air bubbles, while many of the small ones were clear ice, making the entire hailstone appear one solid piece of ice. From the observation it appears that the centers or nuclei of all depended solely upon the surrounding temperature during and after the condensation of the vapor in the atmosphere. Those with centers not solid were constructed of only one solid layer of ice over the nucleus, the thickness depending on the size of the hailstone. The peals of thunder and flashes of lightning did not appear to have any connection with the fall of hail; lightning was visible and the sun came out during the latter part of the hailstorm. The wind velocity was light.

SPECIAL TEMPERATURE OBSERVATIONS MADE ON LOW GROUND IN THE VICINITY OF VICKSBURG, MISS.

By W. S. BELDEN, Section Director. Dated Vicksburg, Miss., May 22, 1907.

It is a well-known fact that on relatively clear nights, with light wind velocity, the temperature is lower in lowlands and valleys than on adjacent uplands. The records of the Weather Bureau show that under these weather conditions the night temperature in cities is higher than that which prevails in the surrounding open country of the same elevation; this difference is largely attributed to the fact that the superincumbent atmosphere is freer from dust motes over the country than over the city, a condition which promotes radiation from the earth's surface in the former case and retards it in the latter.

Frost is frequently reported from regular Weather Bureau stations with a minimum temperature of between 44° and 50°, the frost being generally noted in the suburbs of the city and the temperature readings made in the densely populated portion of the city [within shelters elevated on high buildings].

In order to secure more definite information along this line for Vicksburg and vicinity, a series of special observations covering the months of October and November, 1906, and March and April, 1907, was undertaken by the writer.

Two substations were established on low ground near the city, each being equipped with a maximum and a minimum thermometer, exposed in a cotton-region thermometer shelter. Both shelters were located over sod, with floors 4 feet above the ground. One of the substations, which we will call Station A, was situated in Marcus bottom, a narrow valley about one mile southeast of the observation station. There were no trees or high objects near the shelter. The thermometers were 172 feet above sea level. At the place of observation the valley was only about 150 yards wide, with rather steep bluffs on either side, and the drainage area of the valley to the point of observation was two and one-fourth square miles. The other substation, which we will call Station B, was located about two miles north of the regular observation station and in the Yazoo River bottom, near the National Cemetery. The shelter was placed at the center of a circular plot of sodded ground about 200 feet in diameter, and the nearest high object was a large one-story frame building, used as a box factory, 150 feet west of it. The thermometers were 108 feet above sea level. The Yazoo bottom is several miles wide at the point where observations were made, the station being located 160 feet from the east edge of the valley.

Station A may safely be taken as typical of meteorological conditions that prevail in the numerous narrow valleys to the south and east of Vicksburg, while Station B represents conditions in the low and level lands west and north of the city.

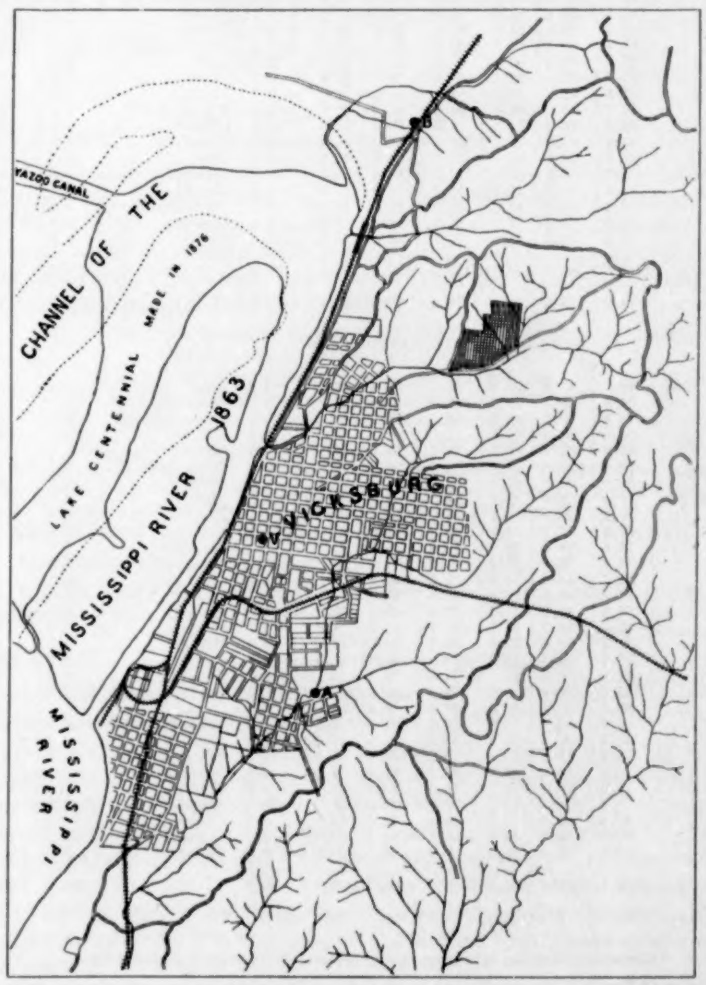


FIG. 1.—Map of the vicinity of Vicksburg, Miss., showing location of the three stations.

At the Vicksburg station the thermometers are located on the post-office building, 63 feet above ground and 289 feet above sea level. A map of Vicksburg and vicinity, showing the location of the three observation stations is reproduced (see fig. 1). Observations were carefully made at the substations at about sunset, and the temperature values of the Vicksburg station that are used in this discussion are based on maximum and minimum readings for the twenty-four hours ending at 7 p. m., local standard time [ninetieth meridian time].

[1] Seventy-fifth meridian time is used.

Table 1.—*Record of special temperature observations made in the vicinity of Vicksburg, Miss.*

MARCH, 1907.

Date.	Vicksburg. Maximum.	Vicksburg. Minimum.	Vicksburg. Range.	Station A. Maximum.	Station A. Minimum.	Station A. Range.	Difference.*	Weather in early morning.	Average velocity, mid. to 6 a.m.	Humidity, 7 a.m.
	°	°	°	°	°	°	°		m. p. h.	%
1	70.0	59.0	11.0	70.3	58.8	11.5	− 0.2	Cloudy	11.0	89
2	64.9	46.0	18.9	66.0	39.0	27.0	− 7.0	Clear	5.6	86
3	74.6	53.0	21.6	73.8	39.7	34.1	−13.3	Clear	3.7	58
4	75.6	52.5	23.1	76.0	46.5	29.5	− 6.0	Clear	12.2	58
5	76.8	58.8	18.0	78.0	53.2	24.8	− 5.6	Partly cloudy	6.9	92
6	71.6	54.2	17.4	71.6	52.5	19.1	− 1.7	Cloudy	7.2	67
7	78.5	58.8	19.7	80.0	56.0	24.0	− 2.8	Cloudy	9.0	95
8	75.4	64.0	11.4	75.0	63.5	11.5	− 0.5	Cloudy	6.9	96
9	79.4	56.3	23.1	81.2	55.8	25.4	− 0.5	Cloudy	8.3	66
10	75.5	63.8	11.7	74.8	61.7	13.1	− 2.1	Cloudy	9.5	94
11	77.5	46.5	31.0	78.4	45.6	32.8	− 0.9	Clear	6.9	82
12	82.4	67.0	15.4	84.4	66.4	18.0	− 0.6	Cloudy	10.9	83
13	80.0	69.2	10.8	81.5	68.8	12.7	− 0.4	Partly cloudy	11.5	77
14	78.9	47.0	31.9	79.0	47.9	31.1	+ 0.9	Cloudy	8.2	91
15	64.4	43.0	21.4	64.8	41.2	23.6	− 1.8	Partly cloudy	7.5	74
16	70.8	45.3	25.5	73.4	36.0	37.4	− 9.3	Clear; lt. frost	5.0	61
17	80.1	59.5	20.6	80.6	52.8	27.8	− 6.7	Cloudy	7.5	94
18	82.5	63.1	19.4	84.0	58.6	25.4	− 4.5	Cloudy	5.3	100
19	83.4	65.7	17.7	84.0	65.9	18.1	+ 0.2	Partly cloudy	10.0	90
20	85.2	64.8	20.4	87.0	64.4	22.6	− 0.4	Clear	8.0	94
21	85.2	62.1	23.1	86.9	56.7	30.2	− 5.4	Cloudy	7.9	95
22	83.0	64.7	18.3	83.0	61.0	22.0	− 3.7	Cloudy	7.0	95
23	83.2	63.0	20.2	84.5	61.2	23.3	− 1.8	Partly cloudy	7.2	94
24	85.5	65.4	20.1	86.5	58.5	28.0	− 6.9	Clear	6.0	95
25	83.2	65.0	18.2	83.1	55.3	27.8	− 9.7	Cloudy	5.9	92
26	87.6	64.0	23.6	88.8	56.0	32.8	− 8.0	Clear	6.2	90
27	85.6	65.6	20.0	87.0	63.2	23.8	− 2.4	Cloudy	7.2	97
28	84.6	66.7	17.9	85.6	65.9	19.7	− 0.8	Cloudy	8.0	92
29	82.4	66.8	15.6	83.8	64.7	19.1	− 2.1	Partly cloudy	8.5	92
30	68.5	59.5	9.0	67.0	58.4	8.6	− 1.1	Cloudy	4.4	98
31	61.5	50.2	11.3	63.2	48.0	15.2	− 2.2	Cloudy	9.3	74
Sums	2417.8	1830.5	587.3	2443.2	1723.2	720.0	−107.3		238.8	2661
Means	78.0	59.0	18.9	78.8	55.6	23.2	− 3.4		7.7	86

APRIL, 1907.

Date.	Vicksburg. Maximum.	Vicksburg. Minimum.	Vicksburg. Range.	Station A. Maximum.	Station A. Minimum.	Station A. Range.	Difference.*	Weather in early morning.	Average velocity, mid. to 6 a.m.	Humidity, 7 a.m.
1	60.5	41.3	19.2	61.2	37.4	23.8	− 3.9	Clear	11.3	52
2	66.0	40.0	26.0	66.4	30.3	36.1	− 9.7	Clear; h'y frost	6.9	46
3	73.5	47.5	26.0	75.1	36.7	38.4	−10.8	Clear; lt. frost	8.3	55
4	74.0	57.1	16.9	75.5	56.3	19.2	− 0.8	Cloudy	8.5	83
5	69.5	57.3	12.2	71.2	55.0	16.2	− 2.3	Cloudy	9.7	97
6	70.4	55.8	14.6	72.0	55.8	16.2	0.0	Cloudy	8.2	93
7	80.0	62.5	17.5	81.0	61.0	20.0	− 1.5	Cloudy	10.5	89
8	72.0	58.6	13.4	74.3	48.5	25.8	−10.1	Clear	4.3	76
9	68.8	45.3	23.5	70.2	36.8	33.4	− 8.5	Clear	6.5	63
10	67.1	52.2	14.9	69.2	41.0	28.2	−11.2	Clear	7.2	54
11	77.6	48.0	29.6	79.0	45.3	33.7	− 2.7	Cloudy	7.5	47
12	75.9	53.5	22.4	74.0	51.8	22.2	− 1.7	Clear	6.0	65
13	66.3	48.0	18.3	71.5	46.9	24.6	− 1.1	Clear	10.2	48
14	58.4	46.6	11.8	59.8	39.3	20.5	− 7.3	Cloudy	6.0	46
15	72.3	51.0	21.3	73.4	48.4	25.0	− 2.6	Cloudy	6.7	59
16	80.9	64.7	16.2	81.7	64.5	17.2	− 0.2	Cloudy	10.0	85
17	71.2	48.6	22.6	69.8	48.6	21.2	0.0	Cloudy	8.7	94
18	77.2	50.5	26.7	79.2	50.2	29.0	− 0.3	Cloudy	3.9	100
19	72.6	50.2	22.4	74.6	49.5	25.1	− 0.7	Cloudy	6.9	80
20	62.0	46.8	15.2	62.8	45.5	17.3	− 1.3	Partly cloudy	7.2	74
21	58.2	47.3	10.9	57.8	46.8	11.0	− 0.5	Cloudy	7.7	94
22	61.0	54.0	7.0	61.9	53.4	8.5	− 0.6	Cloudy	6.0	95
23	63.4	48.0	15.4	60.0	47.8	12.2	− 0.2	Clear	10.5	86
24	73.4	51.0	22.4	75.1	41.8	33.3	− 9.2	Partly cloudy	2.2	78
25	75.4	59.8	15.6	75.9	54.9	21.0	− 4.9	Partly cloudy	7.5	78
26	77.8	63.8	14.0	80.1	63.5	16.6	− 0.3	Cloudy	7.3	92
27	78.4	59.4	19.0	79.8	57.3	22.5	− 2.1	Cloudy	2.7	97
28	84.6	61.3	23.3	86.0	60.5	25.5	− 0.8	Cloudy	6.7	90
29	82.8	65.9	16.9	84.0	61.6	22.4	− 4.3	Cloudy	5.0	98
30	72.7	56.4	16.3	78.0	57.0	21.0	+ 0.6	Cloudy	8.5	88
Sums	2143.9	1592.4	551.5	2180.5	1493.4	687.1	−99.0		218.6	2316
Means	71.5	53.1	18.4	72.7	49.8	22.9	− 3.3		7.3	77

*Difference between minimum temperatures; or Station A minus Vicksburg.

On 15 mornings during the four months the minimum temperature at Station A was more than 10° lower than that observed at the Vicksburg station. These extreme differences occurred when local weather conditions were being dominated by high barometric pressure. The average hourly wind velocity (anemometer on post-office building, 74 feet above ground) from midnight to 6 o'clock on these 15 mornings was 5.4 miles, and the average relative humidity at the Vicksburg station at 7 a. m. on the dates in question was 74 per cent. The greatest difference, 13.3°, occurred on the morning of March 3, when the average hourly wind velocity was 3.7 miles and the relative humidity at 7 a. m. was 58 per cent, the lowest observed at that hour during March.

Detailed records for March and April are given in Table 1. Briefly tabulated results of the investigation are as follows:

Months.	Stations.	Temperature. Mean.	Temperature. Maximum.	Temperature. Minimum.	Temperature. Greatest daily range.
		°	°	°	°
October	Vicksburg	62.7	83.3	41.0	29.0
	Station A	60.6	84.0	32.3	37.7
	Station B	62.2	84.0	34.0	33.0
November	Vicksburg	60.8	83.0	33.0	31.2
	Station A	58.4	84.0	27.3	38.4
	Station B	59.0	84.8	31.5	34.0
March	Vicksburg	68.5	87.6	43.0	31.9
	Station A	67.2	88.8	36.0	37.4
April	Vicksburg	62.2	84.6	40.0	29.6
	Station A	61.2	86.0	30.3	38.4

Temperature departures at Station A, as compared with the Vicksburg station:

	October.	November.	March.	April.
	°	°	°	°
Mean temperature	− 2.1	− 2.4	− 1.3	− 1.0
Mean minimum temperature	− 5.0	− 5.8	− 3.4	− 3.3
Mean maximum temperature	+ 0.8	+ 0.9	+ 0.8	+ 1.3
Average difference in minimum temperatures on generally clear mornings	− 8.2	− 8.7	− 8.1	− 8.9
Average difference in minimum temperatures on generally cloudy mornings	− 1.4	− 0.7	− 1.4	− 1.2
Greatest daily difference in minimum temperatures	−12.3	−12.7	−13.3	−11.2

Temperature departures at Station B, as compared with the Vicksburg station:

	October.	November.
	°	°
Mean temperature	− 0.5	− 1.8
Mean minimum temperature	− 2.0	− 4.7
Mean maximum temperature	+ 1.1	+ 1.2
Average difference in minimum temperatures on generally clear mornings	− 5.6	− 6.0
Average difference in minimum temperatures on generally cloudy mornings	− 0.1	− 0.4
Greatest daily difference in minimum temperatures	−10.4	−11.4

It will be noted that altho Station B was 64 feet lower than Station A, the lowest temperatures occurred at the latter place. This is undoubtedly due to a marked difference in the topographical surroundings of the two stations. Station A, being in a narrow valley with rather steep bluffs on either side, was subject to the influence of air drainage to a much greater degree than Station B. On still, clear nights, the lower strata of air on the hills and hillsides are cooled by radiation, and this cooler and therefore heavier air moves down the valleys in much the same manner that water drains on uneven ground. As this process continues thruout clear nights the valleys become filled with air having a lower temperature than that on the adjacent hills.

During the series of observations frost occurred on twelve mornings: on these the hourly wind velocity averaged 5.4 miles, and the minimum temperature at Station A averaged 8.7° lower than the minimum temperature at the Vicksburg station; the greatest variation was 12.3°, and the least, 5.7°. On October 29 heavy frost formed on low ground, copious deposits being noted on small bridges, but no frost appeared on high ground. The difference is probably due to the higher wind; for the average hourly wind velocity, from midnight to 6 a. m., as shown by the Vicksburg anemometer, 74 feet above ground, was 9.5 miles. On the morning of November 30 there was a temperature difference of 11.0°, with a wind velocity of 9.3 miles.

During periods when dense low clouds prevailed the temperature readings at the three stations showed a close agreement, the night temperatures in the valleys being sometimes slightly higher than at the Vicksburg station.

As a result of these special observations and a previous study of this subject, I offer the following suggestions with a view to securing greater uniformity in the making of frost observations.

Instructions are now in force directing that snow and ice observations be made at places designated by officials in charge of stations.

During periods when low temperature is liable to prove destructive to vegetation, frost reports are given wide dissemination by telegraph, and it would therefore seem that it is just as essential to require that frost observations be made at definite places as it is in the case of ice and snow observations.

Whether an observer finds light frost before completing a morning telegraphic report may sometimes depend upon the extent of his investigation. At some stations the conditions are such that it might work a hardship on an observer to require him to visit a certain designated place for the purpose of making a frost observation in addition to taking the regular morning observation. However, at practically all such stations the office force consists of two or more men, one of whom could make the frost observation and report the same, probably by telephone, to the observer who prepares the telegraphic report. This plan has been in satisfactory operation at Vicksburg during the past seven years.

Where frost observations are made in a definite place, the frost record for any year is directly comparable with that of any other year, even tho changes in the office force occur frequently. Altho the frost records of the Weather Bureau now show a high degree of accuracy, it is believed that more system in the manner of making the observations would result in still greater accuracy.

I would further suggest that at stations where ice and snow and (in case the foregoing plan is adopted) frost observations are made, the location of the places selected for making such observations be noted in the "station memorandum book". In case it should be deemed advisable to make any change in these locations, such changes should also be noted in the "station memorandum book", with reasons therefor, so that by reference to this book these places could be quickly found.

THE PHILIPPINE WEATHER BUREAU.

The Director of the Philippine Weather Bureau, Rev. José Algué, S. J., thru the assistant director, José Coronas, S. J., calls attention to the fact that the observers and employees, both of the observatory and of the meteorological stations thruout the islands, are not mostly Spaniards, as stated in the MONTHLY WEATHER REVIEW for November, 1906, page 517, but are native Filipinos, altho they bear Spanish names; and that, moreover, the only Jesuits actually engaged in the Philippine Weather Bureau are the five officers who constitute the staff of the Manila Central Observatory. He adds:

"Whilst greatly appreciating the courteous praise given our work in the Philippines, we desire that due credit be given to the native observers, whom we find well qualified for such work."—*C. A.*

MAY WEATHER AT BANGOR, MAINE.[1]

According to the monthly report of the weather compiled by Bangor's veteran observer, F. S. Jennison, the month of May was not such a bad one after all. He furnishes a list of the average temperatures for the month of May for the past fifteen years, and during this time, from the point of average, the past month has been the coldest, but the difference in the temperature has been but a very few degrees. The month would not have seemed so cold had it not been for the prevalent winds from the north and northwest. In 1902 the month of May was nearly as cold as the month just past, there being hardly a noticeable difference in the average temperatures of the two months.

On May 7 it snowed for several hours, but it melted almost as soon as it fell. The heaviest rain of the month came on the 27th and 28th. There was a heavy frost May 21, and all during that week there were slight frosts. The mercury stood at 76° on the 19th, which was the warmest day of the month.

The following is the list of the average temperatures for the month of May for the past fifteen years:

Years.	6 a. m.	Noon.	6 p. m.
	°	°	°
1907	35	55	36
1906	45	62	57
1905	39	58	52
1904	42	65	59
1903	43	67	60
1902	35	54	46
1901	36	63	49
1900	36	52	45
1899	39	62	51
1898	36	64	54
1897	39	55	47
1896	43	62	55
1895	49	67	54
1894	44	61	51
1893	40	60	53

[1] Reprinted from the Bangor Daily Commercial of June 1, 1907.

MAY—PAST AND PRESENT.[1]

By E. D. LARNED. Dated Thompson Hill, Windham County, Conn., June 1, 1907.

No, this is not the worst May experienced. It has not even broken my 56-year record. That feat was accomplished in 1882 with its mean temperature below 50°. In the matter of snow it had no snow worth mentioning, only a four hours' fall on the 11th, which did not even whiten the ground. Here is a sample from Ashford Town Book:

> On the fifth day of May, 1761, a very
> Stormy day of snow—an awful sight—
> The trees green and the ground white;
> The sixth day the trees on the blow
> And the fields covered with snow.
>
> EBENEZER BYLES, *Town Clerk.*

Woodstock, May 1, 1761.—The snow began in the morning about sunrise as hard as most ever was known in the winter and was attended with a hard northeast wind. Snowed hard till sundown.

May 19, 1763.—A bad snowstorm.

In recent years we have from Doctor Robbins:

May 10, 1831.—Ground mostly covered with snow. School children threw snowballs and sang gleefully.

> "On the 21st of May
> The snow lay in the way" in 1842.

And as for cold, Rev. Abel Stoles reports May 31, 1764:

At night the severest frost in memory.

Our Thompson journalist, Joseph Joslin, agrees with Doctor Robbins in reporting the severities of 1816, with more picturesqueness of detail, such as "Very exceeding cold", "A very large black frost", "Ice froze as hard as window glass", "Ice on grass top like sheet", "Wore coat, jacket, surtout, and wig and none too hot". The perversity of this season extended till late autumn, causing great distress and scarcity. My father harvested his bushels of "nubbins" in great coat and mittens.

Victoria's accession to the throne was noted as the fulfillment of an ancient prophecy, viz:

> By the power to see through the ways of Heaven
> In one thousand eight hundred and thirty-seven,
> Shall the year pass away without any spring
> And on England's throne shall not sit a King.

The May of 1882, mean temperature 49.27°, exceeded all within my period of observation in unmitigated severity and backwardness. Twenty-five of its mornings were below frost point. An old friend whose birthday, May 17, had for ninety

[1] This article consists chiefly of a letter from Miss Larned, printed in the Hartford Courant of June 4, 1907. Additions have been made from a personal letter.—EDITOR.

years been greeted with apple blossoms missed even an opening bud on the ninety-first. My early harvest[1] in its sunny nook showed but the slightest tint of red on the 25th; lilacs failed to come out for Memorial Day. It may be said that the general backwardness mitigated the damage. The cold Memorial Day of 1884 was followed by the frost which wrought such havoc in market gardens, especially in the vicinity of New York. An eclipse of the sun on the 18th, with unfavorable planetary conjunctions, was held responsible for the perversity of 1882, and its general character—cold, cloudy, windy, moisty—justified the epithet, eclipsy, in that it eclipsed all previous specimens.

Next to it on my own record comes this May of 1907 with mean temperature of 50.39°, maximum of 85°, on the 14th, and minimum of 30° on the 12th. Lilacs on Memorial Day of 1907 were fairly usable; in 1888 they were overblown. In cloudiness 1907 has nearly paralled 1882. The mean of May for fifty years on Thompson Hill was 55.83°; warmest in 1880, 62.33°; range, 13.06°; maximum point 90° in 1880; minimum 27° in 1882 and 1861. Other cold Mays were: 1861, mean 52.21°; 1888, 52.28°. The Mays of 1900, 1901, 1902 were about 3° below the average.

And yet, after all our grumbling, May is May—in spite of Hosea Biglow, who says it is more like "Maynt". Frost can not conquer it, nor custom stale its infinite variety. The trees are now nearly in full leaf. The green of the grass was never so vivid, violets never so blue, dandelions never so plentiful nor golden.

MEMORANDUM ON THE GULF STREAM AND THE WEATHER.

The rather unusual weather of the spring and early summer of 1907 has lead many to ask for the cause, and whether, perhaps, climatic conditions have undergone a permanent change. The statement of a ship captain, or, more properly, that of a newspaper correspondent, to the effect that the location of the Gulf Stream has been altered by earthquakes has led many to imagine that such a change would affect the climate, and that possibly the times of planting, harvesting, etc., will have to be revised.

All of these suggestions and queries show such an entire ignorance of the laws that govern the atmosphere and the weather that it may be worth while to state authoritatively that earthquakes have no appreciable influence on the atmosphere, neither its temperature nor its wind nor its rain.

If any earthquake has had an influence on ocean currents, such as the Gulf Stream, it can only have been by reason of a change in the configuration of the bottom of the ocean; and such changes have always been so small that it is not believed that anyone or a combination of several such could have any appreciable influence on the Gulf Stream.

The Gulf Stream does not itself have any direct specific influence on the climate of North America. In that part of its course off the coast of the South Atlantic States easterly winds bring warm, moist air to the shore; but they would do so if there were no Gulf Stream since the surface of this part of the ocean is warm water, and the easterly winds would always bring its warmth and moisture to the land. In the northern part of its course, opposite the Middle Atlantic States, there is comparatively little east wind, and of course the west wind blows in the wrong direction.

The weather conditions of the South vary from year to year, but the climate, considered as the average of a century, does not change. We have records of unusual variations ever since the arrival of Columbus, and we must expect the same for ages to come. There may possibly be cycles in climate, but we have not yet been able to discover them or define them; and if they exist they certainly represent such small periodic changes as would be utterly insignificant to the planter.

The irregular variations in the weather from day to day and from season to season are due to irregular changes in the general circulation of the atmosphere, by reason of which the air that moves toward the equator and returns toward the poles makes a different circuit every time. The great irregularities of the weather that affect mankind are not due to sun spots, nor to the moon or stars, nor to earthquakes, nor to any other influence outside of the atmosphere, but result from its own internal mechanism. The great masses of air are surging to and fro over the earth's surface like the water boiling in a great caldron; any little float carried along in this water will circulate from the center to the edge and from top to bottom over and over, and yet never go thru the same path twice. In a similar way we never have the same identical sets of winds, temperatures, and rains year after year, but only general seasonal resemblances; and it would take several centuries to show the extreme limits of variability at any given locality. Between the Rockies and the Atlantic we are peculiarly subject to irregularities in cold northerly winds, which on the one hand may bring freezing weather to the Gulf coast, but on the other hand by pushing aside the warm moist air near the ground give rise to large areas of cloud and rain or snow, so that the irregularities in our weather are traceable back to irregularities in the interchange of air between the Tropics and the polar regions.

It has been suggested that a thoro investigation be made into the reliability of the report as to changes in the Gulf Stream—but this report is known to be utterly unreliable. The position of the Gulf Stream can not be ascertained by one observation by any ordinary navigator. Such work would require that a vessel be specially fitted out for the purpose and sail to and fro across the stream at many points, making careful observations of temperature of the water and other data. This was done years ago most thoroly by the cooperation of the Navy, the Coast Survey, and the Bureau of Fisheries, and if it were really worth while, the work could be repeated occasionally. But the exact course of the Gulf Stream has but little interest to meteorologists, however important it may be in questions bearing on the fisheries or on the drift of derelicts and other nautical matters. In fact, the surveys already made show that the surface waters of the Gulf Stream are liable to be pushed aside to a distance of a hundred miles by variations in the winds, those same winds that also affect the climate. It is not the Gulf Stream that affects the winds and the climate, but the winds that affect both the climate and the Gulf Stream. The winds are the prime factors in maintaining and altering the surface currents of the ocean.

The mild climate of western Europe and the still milder climate of the coast of Alaska, British Columbia, and Oregon, are not due to either the Gulf Stream of the Atlantic or the Japan Stream of the Pacific, but to the steady flow of winds laden with moisture from the ocean in general. The severe climates of China, Japan, New England, and Labrador are not due to the distances of the Gulf Stream or the Japan Stream from the respective coasts, but directly to the dry, cold northerly winds themselves.—*C. A.*

CLIMATE AND AGRICULTURE.

The following is an outline of a course of lectures by Prof. T. L. Lyon, of the New York State College of Agriculture, at Cornell University, delivered during the summer of 1906 before the students of the graduate school of agriculture at the University of Illinois, conducted under the auspices of the Association of Agricultural Colleges and Experiment Stations. The author states that in continuation of his studies in wheat and maize, he is intending to publish a paper on the relation

[1] That is, early harvest apple tree.—EDITOR.

of the climate and soil to the crop of barley, particularly as to its brewing qualities.

RELATION OF CEREAL CROPS TO CLIMATE AND SOIL.

By Prof. T. L. LYON.

(1) Modifications in cereal crops induced by changes in their environment.

Experiment and observations show that modifications occur in plants when carried from one environment to another.

These modifications affect the habits of growth and the yield and quality of grain.

Immediate modifications due to the definite effect of environment.

Permanent modifications accounted for by transmission of previously modified characters.

Modifications sufficient to form new strains or varieties. They become more pronounced each succeeding year until they come into equilibrium with the environment.

The same environment may produce different modifications in different plants.

The influence of previous environment in reference to variety testing.

The influence of previous environment on the practise of changing seed.

Productiveness and quality of grain not directly correlated.

There would seem to be an optimum development of vegetative portion of the plant for each environment, in order to produce a maximum of grain.

(2) The relation of wheat to climate and soil.

(a) Influence of climate upon yield and composition.
- A fairly cool, moist growing season favors a large yield of grain.
- A hot, dry growing season favors a high nitrogen content by arresting the development of the kernel.
- A hot, dry growing season also favors a large accumulation of nitrogen by the plant on a soil rich in nitrogen.

(b) Influence of soil upon composition and yield.
- Incomplete maturation produces high nitrogen content on manured soils.
- A poor soil may produce a wheat high in nitrogen thru failure to mature the crop.
- Nitrogenous fertilizers may slightly increase the percentage of nitrogen in wheat.

(c) Influence of soil moisture upon composition, yield, and and length of growing period.
- A concentration of the soil solution increases the percentage of nitrogen in the grain, and permits of rapid growth and early blooming.
- An insufficient supply of soil moisture prevents complete maturation of the crop and thus shortens the growing period.

(d) Conditions affecting the accumulation of nitrogen by the grain, or the yield of nitrogen in grain per acre.
- The supply of available nitrates and other plant food materials.
- The degree of concentration of the soil solution.
- The rate of transpiration.

(e) The conditions under which hard wheat is produced.
- Yellow berries in hard wheat.

(f) Improvement in yield accompanied by lower nitrogen content.

(3) The relation of corn to climate and soil.

(a) Influence of climate upon yield.
- Relation of heat units to length of growing period.
- Relation of yield to length of growing period.
- Relation of temperature to tillering.
- Relation of color of grain to climate.

(b) Influence of soil.
- Relation of tillering to available fertility.
- Relation of barren stalks to available fertility.
- Effect of available nitrogen on composition of kernel.

(c) Influence of soil moisture.

WEATHER BUREAU MEN AS EDUCATORS.

Classes from schools and colleges have visited the Weather Bureau offices to study the instruments and equipment and receive informal instruction, as reported from the following stations:

Dubuque, Iowa, May 18, 1907, about a hundred students from the Iowa State Normal School at Cedar Falls.

Honolulu, Hawaii, May 17 and 22, 1907, the physical geography section of the freshman class of Oahu College, in two divisions.

Little Rock, Ark., May 1 and 2, 1907, the physical geography class of the Little Rock High School, in two sections.

Reno, Nev., May 29, 1907, the physical geography class of the Reno High School.

Syracuse, N. Y., May 11, 1907, the physical geography class from the Warners, N. Y., High School.

THE COLD SPRING OF 1907.

By A. J. HENRY, Professor of Meteorology. Dated June 24, 1907.

The record of temperature for a year is made up of varying periods of increasing and diminishing heat. In spring the successive increments of heat are offset in a measure by incursions of cold northerly winds. These interruptions to the normal annual march of the temperature ordinarily last two or three days, sometimes a week, much less frequently a month, and in extraordinary cases, two months or more, as in the case of the present year.

The length of the cold spell in the south was about two months; in the northern part of the country east of the Rocky Mountains, about seventy-five days. At this writing, June 24, unseasonably cold weather prevails in southern Idaho, Nevada, and Utah, a part of the country exempt from the cold of April and May.

During the progress of the cold weather it was observed, first, that areas of low pressure had almost completely forsaken the main path which follows along the northern boundary to the Lake region and thence down the St. Lawrence Valley; second, that instead of following the northern route, they moved from the southwest to the New England coast, and there remained stationary for several days, meanwhile increasing in strength, and causing a succession of northeast to northwest winds with snow or rain over the whole of New England, the Middle Atlantic States, and as far west as Indiana and the upper Lake region. This departure from the usual behavior of lows continued thruout April.

In May and June the lows were mostly in the form of barometric troughs, which, developing in the far west, were continually crowded a little to the south, so that the northern portions of the respective troughs, instead of passing down the St. Lawrence Valley, generally past east-southeast over the Middle Atlantic States and the ocean south of New England. A movement in this direction holds the winds of New England and the Middle Atlantic States continually in a northerly quarter.

In June, lows from the Southwest, after reaching the Ohio Valley, were effectively blocked in their northeastward course, the result being the formation of secondary disturbances off the Virginia coast, which moved slowly northeastward over the ocean, and thus kept the wind in a northerly or northeasterly quarter over the northeastern portion of the United States. It was not until the middle of June that the prevailing high pressures in the north began to weaken, thus paving the way for southerly winds and warm weather.

Two broad principles in regard to the influence of pressure

distribution on the wind may be here enumerated, viz, high pressure in the northern interior, especially over the Dakotas, causes northerly to westerly and relatively cool winds over the districts both south and east; low pressure over northern districts and the interior valleys and high pressure in the southeast causes warm southerly winds at all times. There are a few minor exceptions, but in general the control of the weather can be referred to the pressure distribution which in turn controls the winds.

The difficulty in the practical application of these principles lies in the fact that nearly half of the North American Continent is *terra incognita* from a meteorological viewpoint. Nothing is yet known as regards the barometric conditions which prevailed in the interior of Canada during the recent cold weather in the United States. The Weather Bureau has accumulated about a third of a century's observations and computed from them systems of normal pressure, temperature, etc. The next logical step is to examine the departures from the normal systems which occasionally form so marked a characteristic of the seasons. The foundation for this study, which must of necessity be most comprehensive, is now being laid; and the work is progressing in order. The underlying causes of the recent cold weather are probably obscure and deep seated. The incentive to discover them is as great as at any previous time in history, and the efforts of many men in many countries are now directed with that end in view.

A set of four charts has been prepared to illustrate the distribution of atmospheric pressure, the resultant winds, and the departure of the mean temperature from the normal for the warm month of March and the cold month of April, 1907. The main point of interest in these charts is the shifting of the area of high pressure from the Southeastern States in March to the Northwestern States in April, and, in consequence, the complete reversal of the winds and temperatures in April as compared with March. (See Charts IX and X, figs. 1–4.)

In this country within the last century there have been one remarkably cool summer, two periods of sixty days or more of cold weather in the late spring (one in 1857 the other in 1907), and a damaging frost in June, 1859, all of which will be briefly discust in the following remarks:

The cold summer of 1816.—Tradition and record both point to 1816 as the coldest continuous spell of summer weather ever experienced in this country. Dire accounts of the unseasonable weather of that year are probably familiar to most persons, but, unfortunately, the complete story of the year has not been told. The writer has collected the record of thermometric observations made in the United States from April to September, 1816, and presents them in Table 1. For comparative purposes similar records for more recent years, especially for the spring of 1857 and April and May, 1907, have been added.

There was nothing out of the ordinary in the winter and autumn of 1816, but beginning in April it was noted that the season did not advance with its accustomed celerity. May was unseasonably cool, but, as may be gleaned from the few comparative means available, not much worse than May of 1907. The culmination of untoward conditions appears to have been reached in the fore part of June, when there seems to have been a depression of temperature attended by snow and ice in the St. Lawrence Valley, northern New York, and northern New England, which was then, and still is, unparalled for the season. Probably the most severe phase of the weather is illustrated by a correspondent of the Boston Recorder, who, writing from Hallowell, Me., under date of June 12, 1816, says:

> There has not been within the memory of the oldest inhabitants nor probably since the first settlement of the country such weather in June as for the week past. On Thursday forenoon a great deal of rain fell, and in the evening so much snow as to cover the ground. It snowed again on Friday, and on Saturday morning it snowed steadily for three hours, the wind about west-southwest. * * *

TABLE 1.—*Temperature records of notably cold seasons.*

Stations.	Year.	April.		May.		June.		July.		August.		Sept.	
		Mean.	Departure.	Mean.	Departure.	Mean.	Departure.	Mean.	Departure.	Mean.	Departure.	Mean.	Departure.
		°	°	°	°	°	°	°	°	°	°	°	°
Brunswick, Me.	1816	40.7	−1.9	48.8	−3.7	55.9	−6.4	61.9	−5.5	63.2	−2.4	55.7	−2.6
Do.	1857	44.3	+1.7	53.8	+1.3	60.7	−1.6	65.2	−2.2	60.8	−4.8	55.4	−2.9
Do.	1859	37.4	−5.2	50.6	−1.9	55.8	−6.5	63.6	−3.8	62.3	−3.3	52.8	−5.5
Lewiston, Me.	1907	39.6	−3.0	49.4	−3.1	....	....	....	....	....	....	....	....
Cambridge, Mass.	1816	44.2	−0.2	52.2	−3.8	61.3	−5.4	65.9	−6.0	67.4	−2.4	57.6	−4.3
Do.	1857	41.8	−2.6	54.7	−1.3	63.4	−3.3	71.6	−0.3	68.2	−1.6	62.0	+0.1
Do.	1859	42.9	−1.5	58.1	+2.1	63.1	−3.6	69.6	−2.3	68.0	−1.8	58.8	−3.1
Chestnut Hill, Mass.	1907	44.0	−0.4	53.7	−2.3	....	....	....	....	....	....	....	....
New Bedford, Mass.	1816	43.1	−1.4	51.8	−2.9	58.8	−5.1	63.6	−5.8	66.0	−2.1	58.5	−3.4
Do.	1857	41.2	−3.3	53.6	−1.1	62.4	−1.5	69.6	+0.2	68.0	−0.1	61.3	−0.6
Do.	1859	43.7	−0.8	55.2	+0.5	62.8	−1.1	68.2	−1.2	67.7	−0.4	59.5	−2.4
Do.	1907	42.5	−2.0	51.4	−3.3	....	....	....	....	....	....	....	....
New Haven, Conn.	1816	42.3	−4.6	52.0	−5.0	60.3	−6.8	65.0	−5.0	67.6	−2.8	57.6	−5.0
Do.	1857	43.2	−3.7	53.5	−3.5	62.0	−5.1	70.2	+0.2	68.8	−1.6	60.3	−2.3
Do.	1859	45.4	−1.5	57.4	+0.4	64.0	−3.1	68.1	−1.9	67.7	−2.7	59.1	−3.5
Do.	1907	43.4	−3.5	58.2	+1.2	....	....	....	....	....	....	....	....
Williamstown, Mass.	1816	42.7	−0.9	52.8	−3.0	60.8	−4.7	64.6	−5.0	64.9	−1.6	55.0	−3.8
Do.	1857	39.2	−4.4	53.5	−2.3	61.5	−4.0	69.7	+0.1	65.2	−1.3	58.2	−0.6
Do.	1859	40.8	−2.8	58.8	+3.0	61.9	−3.6	66.1	−3.5	58.8	−7.7	55.1	−3.7
Do.	1907	40.2	−3.4	50.8	−5.0	....	....	....	....	....	....	....	....
Morrisville, Pa.	1816	47.0	−3.4	57.0	−5.0	64.0	−6.7	68.0	−6.7	66.0	−6.1	62.0	−3.6
Do.	1857	43.1	−7.3	57.7	−4.3	66.2	−4.5	71.5	−3.2	70.0	−2.1	63.5	−2.1
Do.	1859	47.4	−3.0	61.0	−1.0	66.9	−3.8	71.6	−3.1	71.3	−0.8	62.1	−3.5
Beverly, N. J.	1907	47.0	−3.4	56.9	−5.1	....	....	....	....	....	....	....	....

This seems to have been the same storm referred to in a Quebec letter under date of July 10, 1816, in which the correspondent speaks of a week of snow and ice with driving northwest winds, June 7 to 10. This period of frigidity was reported to have been followed by a week of favorable weather, altho the season was then about three weeks backward, and the exportation of grain from Canada had been prohibited until September 10.

The month of July was colder than any July since that time, but there appears to have been sufficient heat for the ripening of wheat and rye. The latter part of June also probably furnished a number of days of summer heat. August was likewise a cool month, but the deficiency of temperature was hardly half as much as in July. September was nearly normal, and by October normal weather prevailed, after five consecutive months of cool weather. The records established in 1816 for June and July stand for all stations, except Brunswick, Me., at which place June and August, 1859, were colder than the corresponding months of 1816.

Predictions of famine thruout New England were freely made, and much alarm was felt over the situation. On July 17 reports from Pennsylvania and New Jersey showed that there would be about half a grass crop and very little corn. From Ohio came the cheering news, however, that altho the prospects were unfavorable at first the yield would far exceed expectation, and that notwithstanding the severe frosts considerable fruit would be saved. Maryland and Virginia also reported an excellent wheat crop, for which $1.50 per bushel was obtained.

On August 7, 1816, the Boston Recorder, commenting editorially on the outlook, said:

> In relation to the season, accounts from all parts of the country present an agreeable reversal of the gloomy reports which were made a few weeks since. Fruits of every description will be abundant. All kinds of grain, except corn, are more promising than in ordinary seasons.

It is evident from the foregoing that 1816 was not such a calamitous year as has been supposed.

The meteorological conditions which caused the cool weather can only be surmised. It is interesting to note, however, that in one other year the temperature sank as low in New England as in 1816; thus in 1787 the temperature at New Haven, Conn., in June sank to 35°, the same as in 1816. June frosts occurred

at New Haven in the following-named years, including 1816:

1806, June 4, frost, temperature 40°.
1816, June 11, frost, temperature 35°.
1843, June 2, frost, temperature 36°.
1859, June 12, frost, temperature 37°.
1864, June 11, slight frost, temperature 41°.

The cold April and May of 1857.—Passing down the line of years from 1816 it will be found that the next pair of consecutively cold months occurred in 1857. As a cold month, April of that year has not been surpast in many places during the last ninety odd years. This is especially true of the upper Mississippi Valley, where the April mean temperature in 1857 at Fort Snelling, Minn., was but four-tenths of a degree above the freezing point, or nearly 5° below the April mean of 1907. The month of May, 1857, was not so cold as May, 1907. In the eastern part of the country the month last named was 4° to 8° colder than May, 1857. Considering the entire period, April 1–May 31, there is little difference between the two years.

So far as can now be ascertained, the effect of the cold weather of April and May, 1857, on the crops was not especially injurious. Some cornfields were replanted, since a lack of heat and excessive rains in the latter part of May caused the seed to rot in the ground. June and the summer months following were warm, and, unlike the present year, the warm weather began June 1, instead of the 15th. A good crop was produced, altho the yield of fruit was somewhat less than the ordinary.

The great frosts of June 5 and 11, 1859.—Two years after the cold spring of 1857, in what had thus far been a normal season, a change of temperature in a single night spread destruction over a large proportion of the wheat fields from eastern Iowa to New York. The corn crop and a great part of the garden truck in the same districts were killed. A killing frost, coming at a time when the wheat was generally considered as past all danger from freezing, overwhelmed the country with astonishment. The areas affected by this destructive freeze were eastern Iowa and Minnesota, northern and central Indiana and Illinois, Wisconsin, Ohio, Michigan, all of Pennsylvania and New York, except the southeast portions, and northern New England. In some localities thin ice was formed in vessels and stagnant pools. The frost of June 11 was not so severe as that of the 5th and 6th. The weather in the west turned cold on the 3d, and the low temperatures continued thruout the 4th with a heavy frost west of the Alleghenies on the morning of the 5th, and to the eastward on the morning of the 6th. Much of the wheat, being in full head and the grain in the milk, was ruined. The peach and apple crop was only partially destroyed. The corn that was but a few inches above ground recovered from the injury and produced a fair crop. The corn that had attained a height of 12 to 18 inches was replanted. Fortunately, the autumnal frosts did not occur until about the close of October, and the replanted fields were fully matured.

In 1874 and 1875 April and May were both deficient in temperature, April especially, but not so markedly as in 1857 or 1907. Wheat in 1874 was a good crop, the yield per acre in the spring wheat States being, however, lower than usual. The corn crop was 82,000,000 bushels less than the crop of 1873. Only a portion of this reduction can be charged to the cold weather and frost, since it was also injured by local droughts and the depredations of the chinch bugs, especially in the west. Conditions were unfavorable for a large crop of oats, but it is impossible to state the effect of the backward weather in the spring.

The average yield of corn per acre in 1874 was low, viz, 20.7 bushels, and the price was high, 64.7 cents per bushel. In 1875 the rate of yield was increased to 29.4 bushels per acre, but the price dropt to 42 cents. The average yield of wheat was reduced 1.3 bushels per acre, and while the aggregate quantity was 16,000,000 bushels less than in 1874, the aggregate value was about $3,500,000 more.

The oat crop was large and the price correspondingly low. The barley, potato, and cotton crops were excellent and prices low.

From the foregoing it would seem that the chance of injury to the staple crops of this country by reason of a backward spring is rather remote, provided, of course, a sufficient amount of heat is supplied in June. In the notable summer of 1816 corn and hay were the only two crops that suffered serious injury, and that summer was the coolest of a century. Drought and heat are much more likely to make serious inroads on the crops than are the chilling blasts of April and May.

BARNES'S "ICE FORMATION WITH SPECIAL REFERENCE TO ANCHOR ICE AND FRAZIL."

By W. W. COBLENTZ. Dated Washington, D. C., June 17, 1907.

The present book by Prof. Howard T. Barnes, of McGill University, is the result of the need which has arisen for republishing the author's various papers on the formation of river ice. It is the story of the ice formation in the St. Lawrence River, and is of especial interest in connection with hydraulic development in the far North, where the winters are long and intensely cold.

The phenomena connected with the formation of river ice are very complex, and, in presenting the subject, the author has very wisely included the elementary notions concerning heat transfer.

The book is divided into eight chapters, which treat of—1, the physical laws governing the transfer of heat; 2, the physical constants of ice; 3, the formation and structure of ice; 4, sheet, frazil, and anchor ice; 5, precise temperature measurements; 6, river temperatures; 7, theories to account for frazil and anchor ice; 8, methods of solving the ice problem in hydraulic engineering work—e. g., steam and electric heating of penstocks, racks, etc., in hydraulic power plants.

In Canada, as well as other localities in high latitudes, three kinds of ice are observed, viz, sheet or surface ice, frazil, and anchor ice. *Surface ice* is found only in still water, and is caused by the loss of heat to the cooler atmosphere, by radiation and conduction from its surface. Thickening of the ice sheet takes place downwards by conduction and radiation of heat thru the ice to the air.

Frazil is the French-Canadian term for fine spicular ice, from the French for forge cinders which it is supposed to resemble. It is formed in all rivers or streams flowing too swiftly for the formation of surface ice. A dull, stormy day, with the wind blowing against the current, is productive of the greatest amount of frazil, which, like anchor ice, has a tendency to sink upon the slightest provocation, and to follow submerged channels until it reaches a quiet bay. Here it rises to the under side of the surface ice, to which it freezes, forming a spongy growth, attaining great thickness; in some cases the author observed a depth of 80 feet of frazil.

Anchor ice, as the name implies, is found attached or anchored to the bottom of a river or stream, and often attains a thickness of 5 to 6 feet. It is also called ground ice, bottom ice, and ground-gru. In a shallow, smooth-flowing river we are more likely to have anchor ice formed in excess, whereas in a deep and turbulent stream we are likely to have more frazil. In a river 30 to 40 feet deep anchor ice is almost unknown, altho large quantities of frazil are met with.

We quote the following from Professor Barnes:

The various facts of common observation in connection with anchor ice point to radiation as the primal cause. Thus, it is found that a

bridge or cover prevents the formation of anchor ice underneath. Such a cover would act as a check to radiation, and reflect the heat waves back again to the bottom. Anchor ice rarely forms under a layer of surface ice covered with snow. It forms on dark rocks more readily than on light ones, which is in accord with what is known as to the more copious radiation of heat from dark surfaces. Anchor ice never forms under a cloudy sky either by day or by night, no matter how severe the weather, but it forms very rapidly under a clear sky at night. Anchor ice is readily melted under a bright sun. It seems highly probable, then, that radiation of heat supplies the necessary cooling to the bottom of a river to form the first layers of ice, after which the growth or building up of the ice is aided by the entangling and freezing of frazil crystals which are always present in the water.

The author found that during rapid ice formation the water becomes slightly undercooled, to the order of a few thousandths of a degree, and that the ice which is formed is in a very adhesive state. On the cessation of cold weather the temperature of the water rises slightly above the freezing point and the ice gradually melts. Anchor ice rises from the bottom in mild weather, and also in extreme cold weather under the influence of a bright sun, when it is dangerous to small boats. It is also known to lift and transport large boulders. On the other hand, a bright sun prevents the water from becoming undercooled and the formation of frazil. The author's conclusion that anchor ice is formed by radiation rather than by conduction is practically the same as that of Farquharson in 1841. It explains the observed phenomena better than any of the other theories propounded. Thus the loosening of the anchor ice under a bright sun is simple enough from the fact that water is transparent to heat waves up to 1 μ ($\mu = 0.001$ mm.). The thickness of the layer of ice that must be melted in order to overcome the adhesion to the rock surface must be of molecular dimensions. In addition to this, there is the tension on the rock surface due to the buoyancy of the ice, which also tends to melt the ice. The explanation of the formation of anchor ice is more difficult, and the author's statement that "It is not to be supposed, because a substance like water has been found to be highly opaque to the radiation from hot bodies, that it will be the same for cold body radiation", is a little startling, and not very clear. There is no evidence for saying that "It is probable that water possesses an absorption band for shorter heat waves, but may become perfectly transparent for the longer heat waves".

It is known that water is exceedingly opaque to heat waves from 4 to 8 μ, but more transparent in the region from 8 to 20 μ. (This was found by Rubens and Aschkinass for water vapor, which behaves like the liquid in its properties for absorbing heat waves, fig. 1.[1]). Beyond 20 μ there is great opacity, the heat waves at 50 μ were entirely absorbed, while at 80 μ theory predicts a band of metallic reflection. As a whole, water differs from most other substances in that its great opacity is due to numerous *small* absorption bands. Consequently its absorption coefficient is smaller than that of a substance like quartz which has bands of metallic reflection at 8.5, 9.02, and 20.75 μ. Hence, there is no objection to saying that "the whole question of the formation of anchor ice depends upon admitting that the long heat waves can penetrate freely thru water". For the maximum radiation of a body at a temperature of 0°C. lies in the region of the spectrum extending from wave lengths 8 to 20 μ, and it is here that water has its greatest transparency for long heat waves.

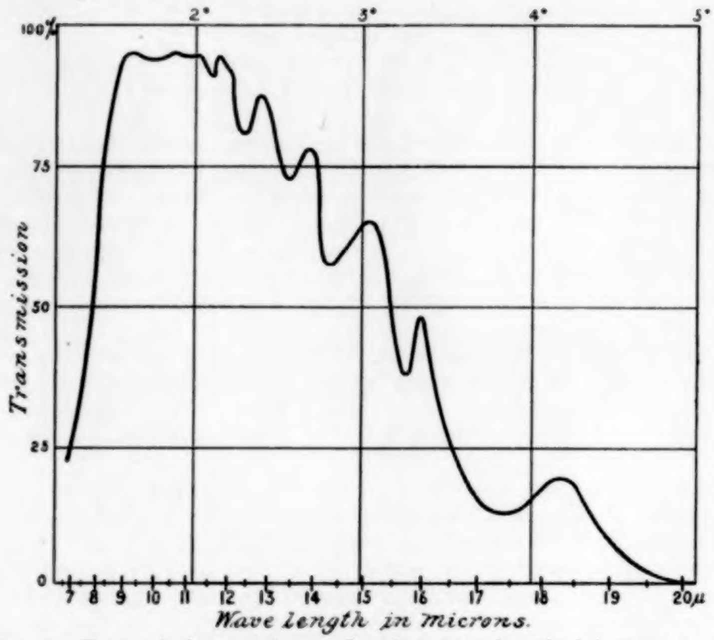


FIG. 1.—Transmission spectrum of water vapor (greatest transparency from 10–15 μ).

It is difficult to conceive of a more complex form of radiation than the one here involved. According to Prevost's theory of exchanges, when two bodies are at different temperatures the hotter receives energy from and imparts energy to the colder by radiation, and vice versa. In the case of the river, when the sky is clear, the water is radiating into space whose temperature is probably near the absolute zero. The river bed is radiating energy into the water, and probably thru it into space. Leaving out of consideration the special nature of the two bodies (water and river bed), it has been established (see Drude's Optics, p. 462) that the radiation from a "nonblack body" is approximately proportional to the square of the refractive index of the surrounding medium, which is transparent, so that from this standpoint the emissivity of the river bed into the water would be greater than that of the water into the air. Of course, if the water were transparent, its emissivity would be *nil*, and the problem would be less complex. Little is known concerning the special nature of these two bodies, but from the fact that the anchor ice separates so easily from the river bed, under a bright sun, it is evident that the absorption coefficient of rock material is greater than that of water, and, hence, that its emissivity must also be greater. Hence, more energy will be radiated from the river bottom than from the water, into space, the river bottom will become the cooler, and finally a film of ice will form on it. During cloudy weather the temperature of the water vapor in the air is equal to or higher than that of the water and the river bottom. There is then an equality in the radiation, or an excess is being emitted from the clouds to the earth. A certain amount will also be returned from the clouds by reflection. Hence, as a whole, the excess of radiation is toward the earth, and since the temperature of the clouds is above the freezing point no anchor ice is formed.

To sum up, from this elaboration of the author's explanation, just quoted, of the formation of anchor ice, it will be seen that it is not only possible but also highly probable that the cause is to be attributed to the greater emissivity of the substances forming the bed of the river, and to the greater transparency of water to heat waves than is generally supposed to obtain for that substance. As a whole, it is difficult to conceive that such a condition can exist, but the magnitude

[1] In the experiments by Rubens and Aschkinass the radiation from glowing zircon passes thru a heated iron tube thru which flows a steady stream of aqueous vapor at atmospheric pressure. The radiant beam falls upon a reflecting spectrometer provided with a sylvite prism, which is transparent to heat waves up to 25 μ. The energy transmitted in any part of the spectrum (after passing thru the column of water vapor) relative to the total energy of the original beam is measured by a thermopile, and is exprest by the ordinates 0–100 per cent, as in fig. 1. The complement of these ordinates is the relative energy absorbed by a layer of vapor 75 centimeters thick, saturated at 100° C. The horizontal scale at the bottom gives the wave lengths in microns as computed from the observed spectrometer settings, which are given at the top of the figure, namely, the angle of deflection for any wave length λ minus the constant angle of deflection for the sodium line, *D*.—EDITOR.

of the heat transfer required to bring about this ice formation must be exceedingly small, and the explanation given accounts for all of the facts observed.

HALOS AND RAIN OR SNOW.

By MARTIN L. DOBLER. Dated Lake Montebello, Baltimore, Md., December 27, 1906.

In compliance with the request in the MONTHLY WEATHER REVIEW of September, 1906, that voluntary observers should look up their old reports and tabulate the dates of halos and the condition of the weather for the twenty-four hours following, I am pleased to give you the best results that I can for the period of my record up to December 27, 1906. I will give both the halos that were followed by rain in twenty-four or thirty-six hours, and also those that were followed by clear weather.

TABLE 1.—*Halos and rain at Lake Montebello, Md.*

Date.	Halos.	State of weather following halo.
November 5, 1905	Solar	Rain, 0.06 inch, occurred on next day.
November 6, 1905	Lunar	Rainfall, 0.06 inch, occurred; partly cloudy.
February 4, 1906	Lunar	Trace of snow day following; cloudy.
February 12, 1906	Solar	Rain, 0.02 inch, followed on 3d day.
March 2, 1906	Lunar	Heavy rain, 0.53 inch, day following.
March 8, 1906	Lunar	Rain, 0.07 inch, occurred on this date.
March 24, 1906	Solar	Rain and snow, 0.03 inch, day following.
April 8, 1906	Solar	Tremendous rain, 1.96 inches, day after.
April 20, 1906	Solar	Trace of rain day after, and 0.13 inch on 3d day.
April 26, 1906	Solar	A partly cloudy day, with high temperature.
May 2, 1906	Lunar	A partly cloudy day; lightning at night.
June 10, 1906	Solar	Heavy rain, 0.71 inch, day following.
August 4, 1906	Solar	Rain, 0.01 inch, occurred 3d day after halo.
September 27, 1906	Lunar	Rain on same date; trace day following.
September 29, 1906	Solar	Rainfall, 0.03 inch, day following.
November 3, 1906	Lunar	Followed by no rain whatever.
November 23, 1906	Lunar	Followed by no rain.

NOTES FROM THE WEATHER BUREAU LIBRARY.

By C. FITZHUGH TALMAN, Assistant Librarian.

The committee appointed by the Governor of Hongkong to inquire whether earlier warning of the typhoon of September 18, 1906, could have been given to shipping has made a report entirely favorable to the officials of Hongkong Observatory. The storm is said to have been of very limited area—about one-eighth the diameter of the average typhoon—and to have moved so rapidly from a point of origin probably near Hongkong that early warning was impracticable. Doctor Doberck, director of the observatory, testified that it was "more like a tornado than a typhoon" and that it "bridges the gap heretofore existing between typhoons and tornadoes." The earlier warnings issued by Zikawei Observatory are said to have referred to a different depression, which passed northwest over Formosa. However, in a pamphlet recently issued from the Manila Observatory,[1] Father Algué maintains that the Formosa and Hongkong storms were identical, and publishes a chart showing the successive positions of the depression for a period of ten days.

It is reported in Symons's Meteorological Magazine for May that Doctor Doberck is about to retire from the directorship of Hongkong Observatory, which he has occupied since 1883.

At a meeting of the Royal Meteorological Society on April 17 a paper was read by Mr. R. L. Holmes on "The phenomenal rainfall in Suva, Fiji, August 8, 1906". About 41 inches of rain is said to have fallen in thirteen hours. This amount is partly estimated, owing to the fact that the gage overflowed several times. (The most remarkable case of excessive rainfall of several hours' duration mentioned in the 2d edition of Hann's Lehrbuch is a fall of 41.44 inches, in one day, at Cherrapunji, India.)

Mr. C. F. von Herrmann, until recently in charge of the Weather Bureau station at Baltimore and of the Maryland and Delaware Section of the Climatological Service, has contributed two memoirs on the local climatology of Maryland, viz, "The climate of Calvert County" and "The climate of St. Mary's County", to special publications of the Maryland Geological Survey devoted to the physical features of the counties in question. These climatological papers have also been issued separately (Baltimore: Johns Hopkins press. March, 1907). They continue the series begun by Dr. O. L. Fassig with "The climate of Allegany County" (Baltimore, 1900), to which the same writer added "The climate of Cecil County" (Baltimore, 1902) and "The climate of Garrett County" (Baltimore, 1902). In 1904 the Maryland Weather Service began publishing Doctor Fassig's "Report on the climate and weather of Baltimore and vicinity", two installments of which have been issued to date. This work, when completed, will probably be the most exhaustive treatise ever published in this country upon the climate of a single station and its neighborhood. The climate of the State, as a whole, was discussed by F. J. Walz in "Outline of present knowledge of the meteorology and climatology of Maryland", published in Maryland Weather Service, [special publication] Vol. I, p. 417-551, (Baltimore, 1899). This work includes abundant statistics concerning normal and extreme values of the meteorological elements, together with isothermal and isohyetal charts; but for collected data, i. e., data for the individual years of record, one must consult the series of county reports now in course of publication, and the special report on the climate and weather of Baltimore.

The Weather Bureau Library has recently received annual résumés of meteorological observations made at the Observatorio Cagigal, Caracas, Venezuela, under the direction of Dr. Luis Ugueto, during the years 1903–1906; also a summary of the rainfall at the same observatory during the years 1891–1902. These are the first meteorological data that have come to us from Venezuela for many years. The principal climatic statistics heretofore available for Caracas are summarized in Zeitschrift der Österreichischen Gesellschaft für Meteorologie, Bd. 7 (1872), p. 379–380. Comparing the results obtained at the Observatorio Cagigal with the earlier observations, we find certain systematic disagreements, especially in the mean temperature data, which are generally 2° to 3° C. lower in the former. It remains to be seen whether the older or the newer observations are at fault, or whether their discordance is to be accounted for by a decided difference in altitude. According to Doctor Ugueto's observations, the mean annual rainfall for the twelve years 1891–1902 was 807.9 mm. (31.81 inches).

Mr. W. F. Tyler, of the Chinese Imperial Maritime Customs, is still pursuing his investigation of the relation of meteorological conditions, especially temperature and humidity, to the sensation of discomfort. His first publication on this subject, "A scheme for the comparison of climates", was reviewed in the MONTHLY WEATHER REVIEW of May, 1904, p. 217. Now we have received a more extensive paper on the subject,[2] in which the psychological aspects of the question are more fully dealt with. The author's "hyther" scale ranges from 0 to 10, 0 representing a perfectly comfortable summer day at Shanghai—warm, but bright, brisk, and bracing—while 10 represents the very worst day ever experienced by the inhabitants of that city—hot, damp, and enervating. So far, discomfort due to cold has not been investigated.

A letter from Professor Scherer, director of the meteoro-

[1] Algué, José. The Hongkong typhoon, September 18, 1906. Advance sheets of the monthly bulletin of the weather bureau for September, 1906. Manila: Bureau of printing. 1906.

[2] Tyler, W. F. The psycho-physical aspects of climate, with a theory concerning intensities of sensation. London: John Bale, Sons & Danielsson. (Reprinted from the Journal of Tropical Medicine and Hygiene, April 15, 1907.)

logical observatory of the Collège St. Martial, Port au Prince, announces that the observatory is shortly to be enlarged; also that additional climatological stations are to be established in Haiti during the current year.

ELECTRIC STORM IN SOUTHERN CALIFORNIA.

The following account of an interesting electrical phenomenon at Calexico, San Diego County, Cal., on the evening of May 27, 1907, is communicated by Professor Bigelow from a letter addressed to him by C. E. Grunsky, the well-known civil engineer in charge of the reclamation of the Salton Sea. Mr. Grunsky has paid special attention to the rainfall of California and the snow on its mountain tops, and is probably correct in saying that the following is a comparatively rare phenomenon. Calexico, as its name implies, is on the boundary between California and Mexico, in longitude 115° 30′ west.—Editor.

In this country, where it never rains, I was fortunate enough yesterday evening to witness a fine and certainly very unique electrical display. Between 5 and 6 p. m. a pronounced storm of small extent, topt by a fine cumulus cloud, was seen in the northeast, but in this valley another, with greater spread of clouds, was seen in the west, but it did not look as tho it would bring rain. Somewhat of a sandstorm preceded the storm from the northeast, which seemed to be scattered by the time it reached the international boundary. Toward 8 p. m. the storm from the west broke loose, with quite fierce lightning for a time and rain, with a continuation of lightning. With the engineers of the California Development Company, I was out watching it. Mr. Herrmann and Mr. Clarke, of the engineering force, were the first to observe an unusual phenomenon entirely new to all of us. There were four or five electrical discharges from clouds to earth, some striking within 1000 to 2000 feet, which left their courses distinctly marked by beautiful strings of fire beads. There seemed to be a bead of fire at every angle in the course of the spark, and these beads remained visible long enough to be clearly seen, perhaps one-quarter second or longer. I personally saw the phenomenon three times, twice very clearly, once thru the foliage of trees. Mr. H. T. Cory, the chief engineer and manager of the company, was the last to see it—only one flash.

I should add that there were many discharges from clouds to earth that were not of the beaded variety.

VALUE OF WEATHER FORECASTS TO NATURAL GAS COMPANIES.

Mr. W. H. Hammon, formerly professor in the Weather Bureau, under date of June 7, 1907, writes from Pittsburg, Pa., to the Editor, in part as follows:

In several of the large natural gas companies with which I am familiar the Weather Bureau records are extremely valuable. The information of weather changes, especially when colder weather is expected in winter, must be known to natural gas operators many hours ahead, in order that the additional supply of gas needed for the colder conditions may be transported the long distances now existing between the gas fields and points of consumption. Gas is now being transported into Pittsburg from points fully 150 miles distant. Some of the cities bordering on Lake Erie are bringing their supply from points more than 200 miles distant. Gas is being transported in Kansas and Missouri thru distances of 200 miles, and you can readily appreciate that under such conditions it is very desirable to know temperature changes as far into the future as possible.

METEOROLOGY IN AUSTRALIA.

From the Daily Telegraph, Sydney, N. S. W., March 14 and April 3, 1907, we learn that the scheme of Mr. H. A. Hunt, the Commonwealth Meteorologist, for the organization of the Commonwealth Meteorological Bureau, is being dealt with by the Minister for Home Affairs, section by section.

Mr. Hunt recently visited all the meteorological offices in the various states of the commonwealth and then submitted his report, with recommendations. The following points seem to be agreed on:

A central office will be organized at the seat of government, but the existing offices of the individual states will continue until the commonwealth can relieve the states of this expense. The duties of the central meteorologist will be the supervision of stations; general climatology; weather predictions and storm warnings; monthly summaries of current weather conditions; care of standard apparatus and comparison, with the instruments in use at the observing stations; maritime meteorology. The central bureau will issue forecasts for the oceans of the entire Australasian area, and also for the five meteorological divisions of Australia itself; but these latter forecasts will be sent only as advisory to the divisional centers located at Perth, Adelaide, Brisbane, Sydney, and Melbourne or Hobart. Daily weather charts will be compiled at the central office by the following process: A blank map of Australia will be cut up into sections and sent to the divisional centers, each of which will enter thereon the daily telegraphic reports for its own region. Copies of these maps will be sent to the central bureaus and to the other divisional centers, where the whole will be pieced together into a complete map of the commonwealth.

Each divisional officer will receive and transmit to the central bureau all weather information. He will be responsible for the dissemination of the bureau's forecasts thruout his divisional area, and in the event of telegraphic communication with the central bureau being interrupted he will issue forecasts for his division. An isobaric chart of the whole commonwealth will be issued daily from each divisional office.

It is recognized that the work of a meteorological service must be supplied to the public and the press with every promptitude. The daily routine and information will be executed and dispatched within the twenty-four hours to which they relate.

With regard to high mountain stations, kite work and balloon work, it is proposed to defer this important research work for the present and to restrict current expenditures to the more perfect equipment of low-level observatories.

RECENT ADDITIONS TO THE WEATHER BUREAU LIBRARY.

H. H. Kimball, Librarian.

The following titles have been selected from among the books recently received, as representing those most likely to be useful to Weather Bureau officials in their meteorological work and studies. Most of them can be loaned for a limited time to officials and employees who make application for them.

Aachen. Meteorologisches Observatorium.
Deutsches meteorologisches Jahrbuch. 1905. Karlsruhe. 1907. 66 p. f°.

Algué, José.
The Hongkong typhoon, September 18, 1906. Manila. 1906. 12 p. 4°.

American climatological association.
Transactions. 1906. Philadelphia. 1906. xx, 303, lx p. 8°.

Angenheister, G.
Bestimmung der Fortpflanzungsschwindigkeit und Absorption von Erdbebenwellen, die durch den Gegenpunkt des Herdes gegangen sind. n. p. n. d. 10 p. 8°. (Nachrichten. Göttingen. Math-phys. Klasse. 1906.)
Seismische Registrierungen in Göttingen im Jahre 1905. n. p. n. d. 60 p. 8°. (Nachrichten Göttingen. Math.-phys. Klasse. 1906.)

Angot, Alfred.
Étude sur la régime pluviométrique de la Méditerranée. Paris. 1907. 19 p. 8°.

Appell, Paul.
... Les mouvements de roulement en dynamique. Paris. 1889. 27 p. 12°. (Scientia No. 4.)

Beutler, Friedrich.
Die Temperaturverhältnisse des aussertropischen Südafrika. Inaug.-Diss ... Jena. Jena. 1906. 74 p. 8°.

Bracke, Albert.
Les cercles lumineux. Mons. [1907?] 16 p. 16°. (Série des curiosités de l'atmosphère. No. 5.)

Buitenzorg. Institut botanique de l'état.
Observations météorologiques. 1905. n. t. p. n. p. f°.

British association for the advancement of science.
Report of the seventy-sixth meeting, York, 1906. London. 1907. v. p. 8°.

Chantriot, Émile.
La Champagne; étude de géographie régionale. Nancy. 1905. xxiv, 316 p. 8°. Thèse ... Univ. Paris. [Climate, p. 183–204. Includes an isohyetal chart. Bibliography, p. xxii.]

Cossu, Angelo.
L'isola di Sardegna. Roma. 1900. 202 p. 8°.
Décombe, L.
La compressibilité des gaz réels. Paris. 1903. 99 p. 12°. (Scientia No. 21.)
Ebert, H[ermann].
Ueber Pulsationen von geringer Periodendauer in der erdmagnetischen Feldkraft. München. 1906. p. 527-543. 8°. (S.-A. Sitzber. Akad. München. Bd. 36. 1906. Heft 3.
Finland. Finska vetenskaps-societetens meteorologiska central-anstalt.
État des glaces et des neiges 1895-1896. Helsingfors. 1907. 49 p. f°.
Flammarion, Camille.
Annuaire astronomique et météorologique pour 1905. Paris. [1905.] 259 p. 12°.
Same. 1906. Paris. [1906.] 270 p. 12°.
Same. 1907. Paris. [1907.] 260 p. 12°.
France. Bureau central météorologique.
Annales. 1903. 2 Observations. Paris. 1905. v. p. f°.
Annales. 1904. 3 Pluies en France. Paris. 1906. (6), 145 p. f°.
Gibbs, J. W.
Diagrammes et surfaces thermodynamiques. [Paris.] 1903. 86 p. 12°. (Scientia No. 22.)
Great Britain. Meteorological office.
Hourly readings . . . at four observatories . . . 1905. London. 1907. xiii, 197 p. f°.
Great Britain. National physical laboratory.
Report, 1906. Teddington. 1907. 43 p. 4°.
Hamburg. Deutsche Seewarte.
Deutsche überseeische meteorologische Beobachtungen. Heft 14. [Hamburg. 1907.] 310 p. f°.
Henriet, H.
Contribution a l'étude de l'air atmosphérique. Paris. 1906. 92 p. 8°.
Hesse. Grossherzogliche hydrographische Bureau.
Niederschlagsbeobachtungen 1906. Darmstadt, 1907. 51 p. f°.
Hooker, R. H.
Correlation of the weather and crops. [London.] 1907. 51 p. 8°. (Repr. J. Roy. statist. soc. v. 70. Pt. 1. 31st Mar., 1907).
Hungary. K. ung. Reichsanstalt für Meteorologie u. Erdmagnetismus.
Jahrbuch 1907. 2 Teil. Budapest. 1907. n. p. f°.
India. Meteorological department.
Memoirs. v. 18. Pt. 1. Calcutta. 1907. f°.
Kodaikanal and Madras observatories.
Annual report for 1906. Madras. 1906. 25 p. f°.
Lindgren, R.
Klimatet i Kajana. (*In:* Geografiska föreningens tidskrift. Arg. 1906. No. 3. Helsingfors. 1906. 8°.)
Macé de Lépinay, J.
Franges d'interférence. [Paris.] 1902. 101 p. 12°. (Scientia No. 14.)
Madrid. Observatorio.
Anuario para 1907. Madrid. 1906. 486 p. 12°.
Marriott, William.
Meteorology in its relation to agriculture. n. t. p. p. 103-108. 8° (*In:* Essex. Education committee. Market-day lectures, 1905-6 . . . Chelmsford. n. d.)
Möller, M.
Die Witterung des Jahres 1907. Leipzig. 1906. 38 p. 8°.
Natal. Government astronomer.
Report. 1906. Durban. 1907. 29 p. f°.
Odessa. Université. Observatoire météorologique et magnétique.
Annales 1906. Odessa. 1907. 157 p. 4°.
Orcolaga, Juan Miguel.
La prevision del tiempo. San Sebastian. 1907. 43 p. 8°.
Pastrana, Manuel E.
El servicio meteorologico de la republica. Mexico. 1906 [15]-35 p. 8°. (*In:* Mexico. Secretaria de fomento. Boletin.)
Pick, H.
Ueber das Klima am Niederrhein. Cleve. 1906. 79, XL p. 8°.
Raoult, F. M.
Cryoscopie. [Paris] 1901. xiii, 106 p. 12° (Scientia No. 13).
Rossi, Michele Stefano de.
. . . . La meteorologia endogena. Milano. 1879-1882. 2 v. xv, 359; ix, 437 p. 8°.
Russia. Central physical observatory.
Annales. 1904. 1 partie. St. Pétersbourg. 1906. v. p. f°.
Same. 2 partie. St. Pétersbourg. 1906. v. p. f°.
Switzerland. Schweizerische meteorologische Centralanstalt.
Schweizerische meteorologische Beobachtungen. Supplementband 1. Zürich. 1885. 265 p. 4°.
Transvaal. Meteorological department.
Report. 1906. Pretoria. 1907. F 147 p. f°.
Troska, A.
Die Vorherbestimmung des Wetters mittelst des Hygrometers (Lambrecht's Polymeter). 3 Auflage. Dresden. 1906. 72 p. 8°.
Tyler, W. F.
The psycho-physical aspect of climate with a theory concerning intensities of sensation. (Repr. C. J. tropical med. and hygiene. Apr. 15, 1907) London. n. d. 45 p. 8°.
Wilmot, E. Eardley.
Notes on the influence of forests on the storage and regulation of the water supply. Calcutta. 1906. 58 p. 4°. (Forest bulletin No. 9.)
U. S. board on geographic names.
Third report. 1890-1906. Washington. 1906. 182 p. 8°.
Westman, J.
. . . . Mesures de l'intensité de la radiation solaire faites à Upsala en 1901. Uppsala. 1907. 55 p. f°. (Handl Akad. Stockholm. Bd. 42. No. 4.)
von Hermann, C. F.
The climate of St. Mary's county. Baltimore. 1907. p. 147-176. 4° (Special publication from St. Mary's county report.)

RECENT PAPERS BEARING ON METEOROLOGY.

H. H. KIMBALL, Librarian.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the Library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——

American climatological association. Transactions. Philadelphia. v 22. 1906.
Schauffler, William Gray. Temperature and sunshine in Lakewood, N. J., 1900-1905. p. 48-50.
Coleman, Thomas D. Winter resorts of the south. p. 51-55 M.
Sewall, Henry. The influence of barometric pressure on nephritis. p. 117-126.
Phillips, W. F. R. Relation of temperature, humidity, and winds to chronic nephritis. p. 292-298.
British association for the advancement of science. Report. London. 1907.
Mill, Hugh Robert. Local societies and meteorology. p. 53-57.
—— Seismological investigations. Eleventh report of the committee. p. 92-103.
Beattie, J. C. Report on results of magnetic observations in the Transkei and in Bechuanaland. p. 132-137.
—— The effect of climate upon health and disease. Report of the committee. p. 424-426.
Schuster, A. Preliminary note on the rainfall periodigram. p. 498.
Stevens, C. O. Telescopic observations of meteorological phenomena. p. 499-500.
Clark, J. Edmund. York rainfall records and their possible indication of relation to solar cycles. p. 500-501.
Lockyer, William J. S. Some barometric and rainfall changes of an oscillatory nature. p. 501-502.
Lyde, L. W. The climate of the wheat area of central Canada. p. 627-628.
Geographical journal. London. v. 29. June, 1907.
Williams, George Bransby. The rainfall of the British East Africa Protectorate. p. 654-660.
London, Edinburgh, and Dublin philosophical magazine. London. 6 ser. v 13. June, 1907.
Olszewski, K. Temperature of inversion of the Joule-Kelvin effect for air and nitrogen. p. 722-724.
Meteorological society of Japan. Journal. Tokyo. 26th year. April, 1907.
Okada, T. Foehn winds at Wonsan in Korea. p. 1-8.
Okada, T. Note on the diurnal heat-exchange in snow on ground. p. 9-16.
Abe, K. On the density of snow on ground and the evaporation from its surface. (Japanese.)
Kaneko, C. On the periodicity of earthquakes. (Japanese.)
Nature. London. v. 76.
—— The Coats observatory, Paisley. (May 16, 1907.) p. 68-69.
Shaw, W[illiam] N[apier]. Dr. Alexander Buchan, F. R. S. (May 23, 1907.) p. 83-84.
Nagaoka, H. The eruption of Krakatoa and the pulsation of the earth. (May 23, 1907.) p. 89-90.
—— Two heavy seismographs. (June 13, 1907.) p. 164.
Royal society. Proceedings. London. Ser. A. v. 79.
Mallock, A. On the resistance of air. p. 262-273.
Royal society. Proceedings. London. Ser. B. v. 79.
Hill, Leonard, and Greenwood, M. The influence of increased barometric pressure on man. No. 3. The possibility of oxygen bubbles being set free in the body. p. 284-287.

Science. New York. New Series. v. 25. May 21, 1907.

Hobbs, William H. Minutes of the first meeting of the committee on seismology. (May 24, 1907.) p. 838-839.

Rotch, A. Lawrence. The International aeronautical conference. (May 31, 1907.) p. 841-845.

Jefferson, Mark S. W. Uplift increases rainfall; denudation diminishes it. (June 7, 1907.) p. 909-910.

Scientific American. New York. v. 96.

—— San Francisco earthquake and engineering construction. (June 15, 1907.) p. 486.

Trowbridge, John. Ball lightning. (June 15, 1907.) p. 489. [Describes the production of artificial ball lightning in the laboratory.]

Scientific American supplement. New York. v. 63.

Maxim, Hudson. What are earthquakes? (May 25, 1907.) p. 26240.

Wilson, Wilford M. The air we breathe. (June 1, 1907.) p. 26266-26267.

Symons's meteorological magazine. London. v. 42. May, 1907.

Inwards, Richard. Weather whims: II. The frog's ladder. p. 63-64.

Smith, D. T. Storms and the sources of their energy. p. 67-69.

Tokyo mathematico-physical society. Proceedings. Tokyo. 2d ser. v. 4.

Omori, F. Comparison of the faults in the three earthquakes of Mino-Owari, Formosa, and San Francisco. (Mch., 1907.) p. 30-32.

Nagaoka, H. Pulsation of the earth and the eruption of Krakatoa. (Mch., 1907.) p. 35-43.

Nagaoka, H. On a residual phenomenon illustrating the aftershocks of earthquakes. (April, 1907.) p. 66-68.

Annales de chimie et de physique. Paris. 7 séries. Tome 11. (Mai, 1907.)

Mathias, E. Recherche de la loi de distribution régulière des éléments magnétiques d'une contrée à une date fixe. p. 5-68.

Archives des sciences physiques et naturelles. Genève. 4 période. Tome 23. 15 mai, 1907.

Mercanton, Paul L. La méthode de Folgheralter et son role en géophysique. p. 467-482.

Ciel et terre. Bruxelles. 27 année. 1 juin 1907.

Vanderlinden. E. Quelques observations de "brouillards ambulants" ou "balles de brouillard". p. 159-166.

Lancaster, A. Les "saintes de glace" en 1907. p. 179-180. [Abnormally warm weather on the days of the "ice saints".]

France. Académie des sciences. Comptes rendus. Paris. Tome 144.

Hergesell, —. L'exploration de l'atmosphère libre au-dessus des régions arctiques. (27 mai 1907.) p. 1187-1189.

Besson, Louis. Nouvelle théorie de l'anthélie, des paranthélies et des halos blancs de Bouguer et d'Hévélius. (27 mai 1907.) p. 1190-1192.

Colin, Ed. El. Observations magnétiques à Tananarive [1906-1907]. (3 juin 1907.) p. 1197-1199.

Géographie (La). Paris. v. 15. Année 1907.

Gautier, E. F. A travers le Sahara français. p. 1-28; 103-129. [Climate, p. 6-10; 108-109.]

Journal de physique. Paris. 4 série. Tome 6. Mai 1907.

Millochau, G. Recherches sur la temperature effective du soleil. p. 389-402.

Nature (La). Paris. 35 année. 25 mai 1907.

Jaubert, Joseph. La durée de l'insolation à Paris. p. 403.

Revue néphologique. Mons. Mai 1907.

Monné, A. J. Nébulosité moyenne à De Bilt, 1897-1907. p. 129-131.

Bracke, A. La nébulosité à Weisswasser de 1866 à 1901. p. 133-134.

Bracke, A. Direction des nuages à Munich: I. Les cirrus et cirro-stratus. p. 135-136.

Société belge d'astronomie. Bulletin. Bruxelles. 12 année. Avril 1907.

Boutquin, A. De l'emploi des appareils de télégraphie sans fil pour l'observation des courants atmosphériques dans les régions polaires. p. 144-151.

Durand-Gréville, E. La vraie relation du ruban de grain avec l'orage. p. 151-155.

Annalen der Hydrographie und maritimen Meteorologie. Berlin. 35 Jahrgang. Heft 6.

—— Die Witterung und phänologischen Erscheinung zu Tsingtau in dem Jahre vom Dezember 1905 bis zum November 1906. p. 241-252.

—— Ueber das Erdbeben und die Flutwelle vom 31. Januar 1906 an der Küste Kolumbiens und Ecuadors. p. 363-366.

Himmel und Erde. Berlin. 19 Jahrgang. Mai 1907.

Knauer, Friedrich. Meteorologie und Vogelzug. p. 359-370.

M., O. Die Zuverlässigkeit der Wetterprognosen. p. 377-380.

Illustrierte aëronautische Mitteilungen. Strassburg. 11 Jahrgang. Juni, 1907.

Rotch, A. L[awrence]. Die meteorologischen Verhältnisse über St. Louis. p. 193-194.

Meteorologische Zeitschrift. Braunschweig. Band 24. Mai, 1907.

Prohaska, Karl. Die Hagelfälle des 6. Juli 1905 in den Ostalpen. p. 193-200.

Meissner, Otto. Ueber die angebliche "wolkenzerstreuende" Kraft des Mondes. p. 200-204.

Gorczynski, Ladislas. Ueber die Wirkung der Glashülle bei den "aktinometrischen" Thermometern. p. 212-218.

Defant, A. Luftdruck und Temperaturwellen in Innsbruck. p. 221-223.

Hann, J. Dr. Hans Meyer über Schnee- und Gletschergrenzen, Vegetationszonen der Hochregionen und klimatische Verhältnisse der Anden von Ecuador. p. 223-226. [Review of work by Meyer.]

Johannsson, Osc. V. Das ungewöhnliche Barometermaximum im Januar 1907. p. 226-227.

—— Witterung in Finnland. p. 228. [Probably the lowest pressure ever observed in Finland.]

—— Meteorologische Beobachtungen im subarktischen Nordamerika 1904. p. 230.

—— Meteorologische Beobachtungen im arktischen Nordamerika im Jahre 1904. p. 230. [Observations at Herschel island in 1904.]

Lottermoser, F. Mittlere Temperatur zu Chimax bei Coban (Guatemala) nach 14 jährigen Beobachtungen. p. 230-232.

Forster, Adolf E. Ausserordentliche Regenmengen in Südtirol im Mai 1905 und November 1906. p. 232-234.

H[ann], J. Zum Klima von Cuyabá Matto Grosso. p. 234-235. [Includes collected data and normals for 1901-1905.]

—— Sonnenlicht und Blutbildung. p. 235.

—— Resultate der meteorologischen Beobachtungen zu Urfa im Jahre 1906. 236.

—— Arctowski über die Windgeschwindigkeit und die atmosphärischen Mondfluten. p. 237-238.

Mitteilungen aus den deutschen Schutzgebieten. Berlin. 20 Band. 1907.

Thomas, —. Ergebnisse der meteorologischen Beobachtungen in Deutsch-Südwestafrika im Jahre Juli bis Juni 1906. p. 91-93.

Heidke, P. Täglicher Gang des Luftdrucks und der Temperatur zu Windhuk vom Juli 1904 bis Juni 1905 wie seine harmonischen Konstituenten. p. 100-105.

Neueste Erdbeben-Nachricht n. Laibach. Jahrgang 6.

Belar, A. Karl Ludolph Greisbach. (April, 1907.) p. 117-119.

Belar, A. Bodenbewegungen und die Stabilität der Bauten. (April, 1907.) p. 120-121. (May, 1907.) p. 149-153.

Weltall (Das). Berlin. 7 Jahrgang. 1907 Juni 1.

Krebs, Wilhelm. Luftdruck-Rekords besonders die grosse Luftdruckschwankung im Januar und Februar, 1907. p. 258-264. [Gives highest and lowest pressure observed at the Deutsche Seewarte for each year 1876-1906. Compares the abnormal pressure fluctuations of Jan.-Feb., 1907, with seismic disturbances and moon-phases.]

Wetter (Das). Berlin. 24 Jahrgang. Mai 1907.

Meissner, Otto. Die Dauer der Kälte-und Warmeperioden in Potsdam in den Jahren 1894-1900. p. 97-100.

Kaiser, Max. Historische Entwickelung unserer Kenntnis der Land- und Seewinde auf der Erde und Darstellung der gegenwärtigen Theorien. p. 101-109.

Cyran, Georg. Die Trockenheit des Jahres 1893 in Mitteleuropa. p. 109-114.

Wiener luftschiffer Zeitung. Wien. 6 Jahrgang. Juni 1907.

—— Der "Windschlag". p. 113.

—— Sonnenfinsternis und Atmosphäre. p. 113-115. [Meteorological observations in balloons during solar eclipses.]

Zeitschrift für Gletscherkunde. Berlin. Band 1. Feb., 1907.

Mercanton, Paul L. Vitesses de propagation des crues provoquées par les débâcles glaciaires. p. 315-316.

Zeitschrift für Instrumentenkunde. Berlin. 27 Jahrgang. Mai 1907.

Schmidt, Adolph. Die magnetischen Variationsinstrumente des Seddiner Observatoriums. p. 137-147.

Società meteorologica Italiana. Bollettino. Series 3. v. 26.

Melzi, Camillo. Confronto dell'acqua caduta a Firenze nei due Osservatorii del Museo e del Collegio della Querce negli anni 1873-78. p. 1-3.

Tellini, Achille. Sul modo di segnalare telegraficamente le previsioni del tempo. p. 4-5.

Societa degli spettroscopisti Italiani. Memorie. Catania. v. 36. 1907.

Oddone, Emilio. Gli andamenti delle radiazioni termica ed attinica del sole durante l'eclisse del. 30 agosto 1905 a Tripoli di Barberia. p. 57-70.

Hemel en dampkring. Den Haag. 5 Jaargang. Mei 1907.

Smits, P. J. Weerkundige waarnemingen te Batavia 1866-1905. p. 8-12.

CORRIGENDA.

Monthly Weather Review for April, 1907, Vol. XXXV, page 187, the total wind movement at Sand Key, Fla., should be 10,228. Page 188, heading should read "April" instead of "March". Page 190, Grand Valley, Colo., precipitation should be 6.80.

THE WEATHER OF THE MONTH.

By Mr. P. C. DAY, Assistant Chief, Division of Meteorological Records.

PRESSURE.

The distribution of mean atmospheric pressure for May, 1907, over the United States and Canada is graphically shown on Chart VI, and the average values and departures from the normal are shown for each station in Tables I and V.

The pressure distribution during May, like that for April, maintained the type common to that of winter over the greater portion of the United States and Canada, and as a result weather commonly expected in March prevailed in nearly all districts during the entire month of May. The great continental area of high pressure over the interior of British America, while reduced somewhat in intensity from that of winter, appears to have remained largely intact during the month, and a vast accumulation of cold air still remained over that region, to be thrown off as areas of high pressure to drift southeastward over the districts from the Rocky Mountains to the Atlantic.

High pressure beyond the northern border of the United States maintained a nearly constant drift of cold surface winds from northerly districts, which, augmented by the unusual southerly paths of the lows, brought unseasonable weather far to the south of the usual limits of such weather for May. Pressure over nearly all interior districts of the United States and Canada, as in the preceding month, was higher than the average, with the most pronounced excess over the northern districts.

Over the upper Missouri Valley and northward over Manitoba the excess varied from +.10 to +.14 inch, while southward the excess above the normal diminished rapidly, and along the Gulf coast, pressure was slightly lower than the average. A slight excess prevailed over the immediate Pacific coast, but over most of the territory west of the Rockies pressure was slightly lower than the average.

TEMPERATURE.

The unseasonably cold weather that characterized the month of April continued without material interruption during the entire month of May, especially over the districts east of the Rocky Mountains, and the month as a whole appears to have been colder over a greater extent of territory than any previous month of the same name during the period of reliable observations. The accumulated deficiency of temperature for the two months, April and May combined, has no known precedent and largely exceeds that of any previous combination of the same months in the history of the Weather Bureau.

The nearly constant presence of high barometric pressure along the northern border of the United States and over the British Provinces from western Ontario to the Rocky Mountains, and diminishing pressure southward, due to the development and passage of numerous areas of low barometer over the southern Rocky Mountain and west Gulf districts, brought all portions of the United States east of the Rocky Mountains, except the Florida Peninsula, under the influence of frequent cold northerly winds, instead of warm southerly winds, which, with the normal May distribution of pressure, generally prevail over these districts.

The month opened with an area of high pressure and decidedly cold weather over all northern districts, the southern movement and increased intensity of which brought to some of the districts along the eastern slope of the Rocky Mountains the lowest temperatures ever recorded in May. At Cheyenne, Wyo., a minimum temperature of 8° occurred on the morning of the 3d, 12° colder than any previous May temperature recorded at that point in a period of thirty-seven years. The above-mentioned cold area spreading southward and eastward brought killing frosts, during the 3d and 4th, from the panhandle of Texas northeastward to the Great Lakes.

About the 10th another high pressure area with unseasonably cold weather overspread all northern districts from the Great Lakes to the Rockies, and during the succeeding two days brought killing frosts from the Lake region and upper Ohio Valley eastward over the northern portion of the Middle Atlantic States and New England.

Cold weather accompanied by killing frosts again overspread the Great Plains districts from the 13th to 15th, carrying the line of freezing temperature into Oklahoma and western Arkansas, and again from the 19th to 22d cold weather dominated all northern districts, with killing frosts in the Lake region and the interior and mountain districts of the Middle Atlantic States.

While no severe cold weather occurred during the greater part of the last decade of the month, the temperature was generally below the normal, and cool, cloudy, unsettled weather interfered seriously with the development of vegetation.

The monthly mean temperature was below the normal for the month over all districts of the United States, except the Florida Peninsula, the States of Washington and Oregon, the western portion of Idaho, and a narrow strip along the coast of California. Over the upper Missouri Valley, the Great Plains, Mississippi and Ohio Valley districts and Lake region the average was from 6° to 10° below the normal, the monthly values as a rule being lower than any previously recorded in May.

Maximum temperatures did not reach 90°, except in southern Georgia and western Florida, in a narrow strip from south-central Texas northward thru Oklahoma, Kansas, eastern Nebraska and western Iowa, and over southern Arizona and the great valleys of California and Oregon between the Coast and Sierra Nevada ranges of mountains. Freezing temperatures occurred in all the mountain districts of the West, and from the panhandle of Texas northeastward over Oklahoma, Missouri, the greater part of the territory north of the Ohio River, the interior of the Middle Atlantic States and the whole of New England, except along the coast.

PRECIPITATION.

The distribution of precipitation during May, 1907, is graphically shown on Chart IV by appropriate shading or by figures representing the actual amount of fall.

The rainfall in May is usually heaviest, from 4 to 6 inches, in the district from the Mississippi River westward to the one hundredth meridian, and from the Texas coast northward to Iowa.

During May, 1907, precipitation was generally deficient in the northern portion of the above district, especially over the eastern portions of Kansas and Nebraska, and central Missouri. The area of heaviest rainfall occupied the lower Mississippi Valley, where amounts from 10 to nearly 30 inches were recorded. In the south-central portions of Louisiana the monthly falls were the greatest on record, while all portions of the State received amounts much in excess of the average, resulting in flooding of much land and serious damage to agricultural interests. Precipitation was also heavy locally in central Florida, in western South Dakota and eastern Montana, over Utah and locally in Arizona and New Mexico.

Precipitation was slightly above the average over most of the Atlantic coast districts south of southern New England, and decidedly above the normal in the lower Mississippi Valley and Gulf States, where heavy falls were of frequent occurrence and seriously interfered with the progress of the season's operations. It was also above the normal locally in Florida, over Texas, and the entire Rocky Mountain region, where the falls were of frequent occurrence and the amounts sufficient for all requirements. Precipitation was generally deficient

from New England westward over New York, Pennsylvania, the Lake region, over the States bordering on the Mississippi River from St. Louis northward, and over the lower Missouri Valley. In the latter district the deficiency was quite marked, but the excess of cloudiness and the generally cool weather prevented rapid evaporation, and the lack of precipitation was rather beneficial than otherwise.

Over the western portion of the Plateau districts and the Pacific coast States the precipitation was uniformly deficient. In all districts where rain usually occurs the distribution thru the month was such that no long periods of dry weather occurred, and no serious lack of moisture prevailed at any time.

The drought that had prevailed since the autumn of last year over the central and southern portions of the Florida Peninsula was generally broken about the middle of the month, thus terminating one of the longest periods of generally deficient rainfall in the history of the State.

At Key West from November 4, 1906, to May 16, 1907, a period of 194 days, the total precipitation amounted to but 2.08 inches, less than 20 per cent of the normal, and the greatest amount of fall for any single storm during that period was 0.29 inch.

SNOWFALL.

Measurable amounts of snowfall occurred over the northern tier of States from New England westward and generally over the Rocky and Sierra Mountain ranges, and the elevated portions of the Plateau region.

Snowfall was relatively heavy over the central Rocky Mountain region, especially over portions of Colorado and Wyoming, where the falls were frequent and at times so heavy and wet as to seriously interrupt telegraphic and telephonic communication. The total fall at some of the higher elevations amounted to as much as 5 feet.

The snowstorm of the 3d over northern Kansas, the whole of Nebraska, and the western portions of Iowa and Missouri covered those districts to depths of from 3 to 8 inches, and was probably the latest date in May on record in those districts when snow was so general, and covered the ground to such depths.

On account of the prevailing cool weather no rapid decrease occurred in the volume of snow in the mountains; the melting was slow and much of the water resulting therefrom found its way into the soil. The run-off was therefore moderate, but being well distributed thru the month maintained a good flow of water in most of the streams in those districts.

HUMIDITY AND SUNSHINE.

The amount of moisture in the atmosphere was slightly less than the average from New England westward to the Great Lakes and the Upper Mississippi Valley, also over the northern portions of North Dakota and Montana and generally over the Pacific coast districts.

It was generally in excess over the Gulf States and lower Mississippi Valley and from 10 to 15 per cent above the average over the Great Plains, Rocky Mountains, and most of the Plateau districts.

More than the normal amount of sunshine prevailed over the Florida Peninsula and over the valleys of California and Oregon between the coast and Sierra Nevada ranges of mountains.

Over the remainder of the country sunshine was deficient, and largely so in the lower Mississippi Valley and adjacent districts.

The month, as a whole, may be classed as one which the elements of cold, frost, clouds, rain and snow successfully conspired to render unusually unfavorable for the development of vegetation or the prosecution of the usual outdoor occupations, and the retardation of the season so pronounced at the end of April was even more apparent at the end of May.

WEATHER IN ALASKA.

From telegraphic reports received thru the courtesy of the Chief Signal Officer and from cooperative observers in that territory, it appears the weather for May was comparatively mild and remarkably free from severe changes. The day temperatures were well above the freezing point, and the night temperatures but slightly and at infrequent intervals below that point.

Much clear weather prevailed, and in the interior the precipitation appears to have been light, with but little snow.

The Yukon River was open for navigation by the 3d of the month, and at North Fork, near the international boundary, and but a short distance south of the Arctic Circle, the observer reports that corn, peas, radishes, onions, lettuce, and cabbage were up and doing well.

Average temperatures and departures from the normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	12	49.4	− 5.4	−15.4	− 3.1
Middle Atlantic	16	57.2	− 4.4	− 7.5	− 1.5
South Atlantic	10	68.9	− 0.9	+ 5.0	+ 1.0
Florida Peninsula *	8	77.1	+ 1.4	+11.1	+ 2.2
East Gulf	11	70.1	− 2.2	+13.2	+ 2.6
West Gulf	10	67.7	− 5.0	+14.0	+ 2.8
Ohio Valley and Tennessee	13	60.3	− 4.9	+ 0.5	+ 0.1
Lower Lake	10	50.2	− 7.0	−10.8	− 2.2
Upper Lake	12	44.7	− 7.5	−10.2	− 2.0
North Dakota *	9	44.5	− 8.7	−18.2	− 3.6
Upper Mississippi Valley	15	54.3	− 7.6	− 3.4	− 0.7
Missouri Valley	12	54.9	− 7.1	− 0.3	− 0.1
Northern Slope	9	48.2	− 4.8	− 3.0	− 0.6
Middle Slope	6	56.5	− 6.4	+ 8.1	+ 1.6
Southern Slope *	7	62.6	− 6.5	+13.9	+ 2.8
Southern Plateau *	12	60.1	− 4.7	+ 8.3	+ 1.7
Middle Plateau *	10	52.0	− 3.5	+14.9	+ 3.0
Northern Plateau *	12	54.8	− 0.1	+ 1.0	+ 0.2
North Pacific	7	54.7	+ 1.6	− 0.4	− 0.1
Middle Pacific	8	59.2	− 0.8	+ 1.8	+ 0.4
South Pacific	4	61.1	− 0.4	+ 4.8	+ 1.0

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Director R. F. Stupart says:

The mean temperature for May was below the average thruout Canada, except in British Columbia and the Yukon Territory, where small positive differences were recorded. The negative departures from average were especially large from Saskatchewan to New Ontario, ranging between 10° in the former province, and 13° in the latter district. In Quebec differences were from 2° to 7°, and in the Maritime Provinces from 3° to 4°. An excess of from 2° to 4° occurred in British Columbia, and of 5° in the Yukon Territory.

Average precipitation and departures from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	12	3.15	91	−0.3	−3.4
Middle Atlantic	16	3.90	108	+0.3	−3.4
South Atlantic	10	4.37	110	+0.4	−6.6
Florida Peninsula *	8	5.94	168	+2.4	−4.4
East Gulf	11	7.31	182	+3.3	+0.2
West Gulf	10	6.33	143	+1.9	−2.2
Ohio Valley and Tennessee	13	4.02	103	+0.1	−0.7
Lower Lake	10	2.98	88	−0.4	−0.9
Upper Lake	12	2.52	76	−0.8	−1.2
North Dakota *	9	1.52	68	−0.7	−1.8
Upper Mississippi Valley	15	3.24	78	−0.9	−1.0
Missouri Valley	12	3.51	85	−0.6	−1.8
Northern Slope	9	3.32	143	+1.0	0.0
Middle Slope	6	3.00	83	−0.6	−1.5
Southern Slope *	7	3.43	92	−0.3	−1.6
Southern Plateau *	12	0.69	141	+0.2	+1.7
Middle Plateau *	10	1.44	153	+0.5	+1.4
Northern Plateau *	12	1.29	78	−0.4	+0.1
North Pacific	7	1.38	50	−1.4	−6.4
Middle Pacific	8	0.54	35	−1.0	+2.3
South Pacific	4	0.06	17	−0.3	+1.7

* Regular Weather Bureau and selected cooperative stations.

In Canada.—Director Stupart says:

There was an almost general deficiency in precipitation over the Dominion, the widest departures from average occurring in British Columbia, where in most districts the rainfall was less than 1 inch. In the western provinces the aggregate of rain and melted snow was very generally less than half the average, but some few stations in northern Alberta and northeastern Saskatchewan recorded an average amount In Ontario, it was only in Algoma, Nipissing, and the Niagara Peninsula that a normal amount was recorded, other parts of the province, and also western Quebec, showing a deficiency of between 30 and 40 per cent. In eastern Quebec and the northern portions of the Maritime Provinces, including Prince Edward Island, it was slightly in excess, while other districts showed a small deficiency.

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Buffalo, N. Y	27	61	sw.	North Head, Wash	18	60	se.
Canton, N. Y.	13	55	sw.	North Platte, Nebr	20	60	sw.
Do	27	50	w.	Oklahoma, Okla.	14	54	nw.
Cleveland, Ohio	27	50	w.	Pensacola, Fla.	31	50	s.
Jacksonville, Fla	8	56	se.	Pierre, S. Dak.	25	55	e.
Lewiston, Idaho	10	62	w.	Pittsburg, Pa	4	50	nw.
Lincoln, Nebr	12	50	s.	Point Reyes Light, Cal	2	55	nw.
Do	17	52	n.	Do	3	84	nw.
Do	22	52	nw.	Do	4	50	nw.
Memphis, Tenn	6	52	w.	Do	5	50	nw.
Modena, Utah	11	58	sw.	Do	12	50	nw.
Mount Tamalpais, Cal	2	50	nw.	Do	22	52	nw.
Do	3	76	nw.	San Antonio, Tex	8	56	nw.
Do	23	58	nw.	Sand Key, Fla	11	50	sw.
Do	24	64	nw.	Sioux City, Iowa	12	52	s.
North Head, Wash.	9	70	se.	Southeast Farallon, Cal.	3	54	nw.
Do	10	64	se.	Toledo, Ohio	26	52	sw.

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	74	−4	Missouri Valley	65	0
Middle Atlantic	72	0	Northern Slope	66	+8
South Atlantic	76	+2	Middle Slope	65	+4
Florida Peninsula	76	0	Southern Slope	60	−1
East Gulf	78	+7	Southern Plateau	39	+7
West Gulf	79	+4	Middle Plateau	51	+5
Ohio Valley and Tennessee	69	+3	Northern Plateau	50	−6
Lower Lake	71	0	North Pacific	76	0
Upper Lake	70	−2	Middle Pacific	70	−1
North Dakota	65	+3	South Pacific	69	0
Upper Mississippi Valley	69	+1			

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	6.3	+0.8	Missouri Valley	5.9	+0.5
Middle Atlantic	5.7	+0.5	Northern Slope	6.1	+0.7
South Atlantic	5.0	+0.6	Middle Slope	5.7	+0.9
Florida Peninsula	4.0	−0.5	Southern Slope	5.0	+0.5
East Gulf	6.4	+2.1	Southern Plateau	2.9	+0.7
West Gulf	6.1	+1.2	Middle Plateau	4.8	+0.7
Ohio Valley and Tennessee	5.6	+0.5	Northern Plateau	4.6	−1.0
Lower Lake	5.5	+0.3	North Pacific	6.0	+0.1
Upper Lake	6.1	+0.6	Middle Pacific	4.9	+0.7
North Dakota	6.0	+0.7	South Pacific	3.5	−0.7
Upper Mississippi Valley	6.0	+0.8			

CLIMATOLOGICAL SUMMARY.

By Mr. James Berry, Chief of the Climatological Division.

TEMPERATURE AND PRECIPITATION BY SECTIONS, MAY, 1907.

In the following table are given, for the various sections of the Climatological Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings.

The mean temperatures for each section, the highest and lowest temperatures, the average precipitation, and the greatest and least monthly amounts are found by using all trustworthy records available.

The mean departures from normal temperature and precipitation are based only on records from stations that have ten or more years of observation. Of course the number of such records is smaller than the total number of stations.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	68.0	− 3.7	Ashville Evergreen	92 92	25 26	Valley Head	37	28	7.94	+ 4.80	Pushmataha	15.16	Ozark	3.22
Arizona	65.3	− 3.9	Aztec	110	17	Fredonia Chlarsons Mill	20 20	23 27	0.77	+ 0.36	Huachuca Reservoir.	2.44	2 stations	0.00
Arkansas	63.8	− 6.0	3 stations	91	3 dates	Bergman Pond	31 31	15 15	9.48	+ 4.32	Marvell	12.86	Eureka Springs	5.61
California	61.5	− 1.1	Mammoth Tank	110	20	Blue Canyon	10	12	0.57	− 0.72	Monumental	7.25	40 stations	0.00
Colorado	47.3	− 5.8	Holly Las Animas	95 95	12 21	Wagon Wheel Gap	− 3	1	2.39	+ 0.49	Corona	7.03	Lamar	0.76
Florida	76.2	+ 0.4	Orange City	99	3, 10	Molino	42	17	4.86	+ 1.29	Fort Meade	15.58	Johnstown	0.99
Georgia	70.1	− 1.9	Dawson	96	24	Diamond	38	17, 18	4.26	+ 1.11	Waynesboro	8.63	Experiment	2.27
Hawaii	72.3†	......	2 stations	94	24, 26	Waimea, Hawaii	45	23	4.33‡	......	Maunawili, Oahu	16.78	Kahului, Maui	0.00
Idaho	53.3	+ 0.1	Orofino	95	31	Forney	16	5	0.89	− 0.83	Grace	2.94	3 stations	T.
Illinois	56.7	− 6.1	Mount Vernon	92	18	Carrollton Lanark	22 22	1 11	4.05	+ 0.05	Mascoutah	8.19	Peoria	2.08
Indiana	56.7	− 5.9	Jeffersonville Madison	91 91	23 23	Auburn South Bend	26 26	1, 21 11	3.70	− 0.66	Farmersburg	7.54	Cambridge City	2.26
Iowa	53.5	− 7.2	Elliott	96	22	Whitten	14	4	3.48	− 0.78	Tipton	7.68	Clear Lake	0.71
Kansas	58.3	− 6.1	Jewell	99	22	Hays	17	15	2.48	− 1.90	Columbus	8.03	Hill City	0.20
Kentucky	61.3	− 5.0	Paducah	93	23	Greensburg Williamstown	30 30	5 12	5.07	+ 1.37	Lynville	9.58	Shelbyville	2.36
Louisiana	70.9	− 3.2	Reserve	95	20	Ruston	40	3	15.19	+12.16	Opelousas	29.70	Plain Dealing	6.26
Maryland and Delaware	58.1	− 4.6	Keedysville, Md	91	14	Deer Park, Md	23	12	4.74	+ 1.06	Denton, Md	8.05	Great Falls, Md	1.59
Michigan	44.5	− 7.6	Allegan	88	13	Thomaston	10	1, 4	2.54	− 0.86	Mackinac Island	5.00	Reed City	0.57
Minnesota	45.5	− 9.4	3 stations	89	12	Angus	7	2	2.14	− 1.26	Willow River	3.97	Hallock	0.39
Mississippi	67.8	− 4.6	4 stations	91	3 dates	Austin Ripley	40 40	2 5, 16	10.85	+ 7.02	Columbia	22.30	Tchula	4.24
Missouri	59.5	− 6.1	3 stations	91	3 dates	Bethany	17	4	5.56	+ 0.87	Koshkonong	10.89	Oregon	1.39
Montana	47.7	− 4.3	Bear Creek	92	31	Goldbutte	10	2	2.41	− 0.25	Evans	9.20	Plains	0.08
Nebraska	53.7	− 5.7	Osceola	98	21, 22	Fort Robinson	7	1	2.88	− 0.77	Seward	7.13	Nemaha	0.68
Nevada	51.8	− 3.0	Logan	99	31	McAfees Ranch	13	1	0.56	− 0.48	Eureka	2.62	5 stations	T.
New England*	49.9	− 5.4	Waterbury, Conn	91	14	Greenville, Me	17	29	3.07	− 0.59	Hawleyville, Conn	5.95	Cornwall, Vt	0.83
New Jersey	55.4	− 5.4	Belvidere	91	14	Layton	22	12	5.65	+ 1.31	Vineland	8.00	Belvidere	2.51
New Mexico	55.1	− 5.4	Lordsburg	96	4	Winsors	10	1	1.42	+ 0.23	Mountainair	4.24	2 stations	T.
New York	50.4	− 6.2	Coeymans	93	14	Griffins Corners	15	12	3.37	0.00	Mount Hope	7.31	Harkness	1.11
North Carolina	65.2	− 2.3	Goldsboro	96	24	Buck Spring	19	28	4.53	− 0.01	Sapphire	7.45	Graham	1.38
North Dakota	44.0	− 9.8	Amenia	84	28	Devils Lake Melville	6 6	2 2	1.11	− 1.29	Kulm	3.81	2 stations	T.
Ohio	54.5	− 6.8	4 stations	89	14, 23	5 stations	24	3 dates	3.47	− 0.20	Columbus Reservoir.	6.28	Rittman	2.15
Oklahoma and Indian Territories.	61.9	− 6.8	Hobart, Okla	101	16	Harrington, Okla	22	4	5.02	− 0.62	Idabel, Ind. T	11.39	Brule, Okla	1.15
Oregon	53.6	+ 2.1	Grants Pass	98	30	Silver Lake	14	2	1.67	− 0.92	Port Orford	4.64	Ontario	0.10
Pennsylvania	54.8	− 5.3	Hanover Mauch Chunk	91 91	14 14	Montrose	19	12	3.08	− 0.93	Philadelphia (c)	6.38	Scranton	1.44
Porto Rico	75.8	......	Central Aguirre	94	31	Cayey	52	12	8.53	......	Maricao	17.11	Vieques	3.10
South Carolina	70.8	− 1.4	Little Mountain	96	20	Dillon	41	22	4.51	+ 1.12	Bowman	8.97	Barksdale	1.98
South Dakota	48.9	− 8.4	3 stations	93	12	Frederick	13	3	3.83	+ 0.65	Fort Meade	10.95	Kidder	1.73
Tennessee	63.4	− 4.3	Dickson, Dover	92	23	Rugby	30	5	6.33	+ 2.70	Dickson	10.56	Elizabethton	1.52
Texas	68.3	− 5.4	Eagle Pass	107	13	Plemons	22	4	6.73	+ 2.90	Beaumont	19.40	Fort Davis	0.00
Utah	52.7	− 3.1	St. George	97	19	Plateau	16	1	2.04	+ 0.88	Alpine	4.30	Marysvale	0.26
Virginia	60.8	− 3.7	Arvonia	92	19	Burkes Garden	24	22	3.54	− 0.47	Doswell	7.63	Danville	1.30
Washington	57.5	+ 1.7	Zindel	98	31	Northport	23	4	1.40	− 1.10	Quiniault	5.66	Coupeville	0.19
West Virginia	59.0	− 3.4	Sutton	93	14	Bayard	24	12	3.88	− 0.16	Terra Alta	6.37	Nuttallburg	1.38
Wisconsin	47.7	− 8.1	Whitehall	91	12, 13	Hayward	11	4	2.60	− 1.39	Racine	4.29	Osceola	0.66
Wyoming	44.9	− 4.5	Fort Laramie	89	20	Blue Cap	4	3	2.38	+ 0.36	Blue Cap	9.40	Green River	0.48

* Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, and Connecticut. † 49 stations. ‡ 145 stations.

DESCRIPTION OF TABLES AND CHARTS.

By Mr. P. C. Day, Assistant Chief, Division of Meteorological Records.

For description of tables and charts see page 30 of Review for January, 1907.

TABLE I.—*Climatological data for U. S. Weather Bureau stations, May, 1907.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.									Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
New England.							49.4	−5.4										74	3.15	−0.3										6.3	
Eastport	76	69	85	29.86	29.94	−.02	44.4	−2.5	63	17	51	30	12	38	23	41	37	79	1.84	−1.8	8	7,770	s.	36	nw.	5	1	18	12	7.0	4.5
Portland, Me.	103	81	117	29.86	29.98	+.01	48.0	−5.5	70	19	55	30	12	41	26	43	37	68	1.99	−1.6	9	6,934	s.	40	nw.	29	5	11	15	6.7	T.
Concord	288	70	79	29.66	29.98	.00	49.7	−6.0	81	14	60	29	12	40	41	...	...	...	2.56	−0.6	10	4,609	nw.	24	nw.	11	15	9	7	4.4	T.
Burlington	404	12	47	29.54	29.99	+.02	48.0	−8.9	78	13	57	29	5	39	36	...	...	...	1.54	−1.5	10	8,914	w.	45	se.	13	5	10	16	7.0	0.1
Northfield	876	16	70	29.04	29.99	+.02	46.2	−7.3	78	13	56	24	25	36	37	43	40	76	1.92	−0.9	8	7,176	s.	32	se.	15	2	9	20	7.7	1.0
Boston	125	115	188	29.85	29.99	+.01	52.4	−4.2	81	19	60	33	12	45	33	47	42	70	3.12	−0.5	13	7,832	w.	32	nw.	29	7	10	14	6.6	T.
Nantucket	12	14	90	29.97	29.98	−.01	48.3	−4.7	64	19	54	35	4	43	21	45	42	81	4.23	+0.7	14	11,895	sw.	43	se.	4	7	10	14	6.6	
Block Island	26	11	46	29.97	30.00	+.01	48.4	−4.5	69	19	54	35	12	43	19	45	43	84	4.95	+1.2	11	11,567	sw.	42	w.	29	10	9	12	5.6	
Narragansett	...	9	...	...	...	...	49.2	−5.5	72	19	57	29	12	41	35	...	...	...	4.93	+0.9	12	...	sw.	...	...	...	12	8	11	...	
Providence	160	57	67	29.83	30.00	+.02	51.8	−6.7	80	19	61	32	12	43	33	45	39	68	3.72	...	12	5,499	w.	27	nw.	28	6	15	10	6.2	T.
Hartford	159	122	132	29.83	30.00	−.02	53.0	−4.5	88	14	62	32	12	44	38	46	40	68	3.35	...	15	5,473	s.	28	s.	13	6	10	15	6.2	T.
New Haven	106	116	155	29.89	30.00	+.01	53.0	−4.6	80	19	62	33	12	44	30	47	42	71	4.42	+0.8	14	6,824	nw.	27	sw.	19	9	12	10	5.4	T.
Mid. Atlantic States.							57.2	−4.4										72	3.90	+0.3										5.7	
Albany	97	102	115	29.89	30.00	+.02	52.8	−6.1	87	14	62	32	12	44	32	47	41	69	3.21	0.0	11	6,433	s.	29	se.	15	6	13	12	6.1	0.5
Binghamton	875	79	90	29.06	30.00	+.02	51.1	−5.9	86	14	61	28	12	41	35	...	...	...	1.48	−1.7	11	4,980	nw.	31	s.	15	5	9	17	6.9	0.3
New York	314	108	350	29.66	30.00	+.01	55.3	−4.0	83	14	63	36	12	48	30	48	42	67	4.08	+0.9	12	8,683	nw.	48	w.	4	9	10	12	5.8	
Harrisburg	374	94	104	29.62	30.02	+.04	56.8	−4.9	86	14	66	36	12	48	34	49	43	65	1.45	−3.2	14	5,768	nw.	29	nw.	27	9	10	12	5.7	
Philadelphia	117	116	184	29.89	30.02	+.03	57.6	−4.6	84	15	66	38	12	49	32	51	46	71	5.61	+2.4	14	7,677	nw.	30	nw.	4	6	8	17	6.5	
Scranton	805	111	119	29.14	30.00	+.02	53.6	−5.2	87	14	63	29	12	44	39	46	39	62	1.44	...	11	5,912	sw.	28	sw.	18	5	17	9	6.1	T.
Atlantic City	52	37	48	29.96	30.02	+.04	54.0	−3.5	81	19	60	37	12	48	26	50	46	80	5.51	+2.7	15	6,417	sw.	31	se.	4	7	6	18	6.6	
Cape May	17	48	52	30.02	30.04	+.05	54.6	−4.0	73	19	60	36	12	49	21	50	...	...	7.73	+4.6	17	6,612	s.	30	nw.	27	10	12	9	5.4	T.
Baltimore	123	69	117	29.87	30.00	+.01	59.0	−5.2	84	19	68	39	12	50	28	52	45	64	2.92	−0.9	15	5,737	nw.	36	w.	4	9	9	13	5.8	
Washington	112	59	76	29.88	30.00	.00	59.2	−5.0	85	14	69	39	12	49	34	54	51	78	5.03	+1.1	16	5,170	s.	35	nw.	4	14	6	11	4.8	
Cape Henry	18	11	58	29.99	30.01	+.01	61.7	−2.5	88	19	70	46	22	54	28	...	...	...	2.64	−1.4	15	10,395	sw.	42	n.	27	12	11	8	4.9	
Lynchburg	681	83	88	29.26	30.00	.00	62.2	−3.7	88	19	74	38	12	51	39	57	53	74	3.30	+0.6	11	2,906	nw.	24	nw.	27	12	11	8	5.1	
Mount Weather	1,725	10	57	28.19	30.00	.00	54.0	−5.5	78	14	63	33	21	45	28	50	46	80	3.05	...	18	11,961	nw.	44	nw.	28	10	13	8	5.0	
Norfolk	91	102	111	29.92	30.02	+.02	63.2	−3.0	89	19	72	46	12	54	30	57	53	74	3.20	−1.1	16	7,194	s.	30	s.	6	10	11	10	5.5	
Richmond	144	145	153	29.86	30.01	+.02	62.7	−4.6	89	19	73	42	12	52	34	...	...	...	5.78	+2.1	16	6,031	se.	29	w.	27	11	11	9	4.9	
Wytheville	2,293	40	47	27.64	29.98	−.01	58.2	−3.2	82	24	70	33	22	47	41	53	49	75	2.72	−1.1	15	3,724	w.	22	w.	7	12	10	9	4.7	
S. Atlantic States.							68.9	−0.9										76	4.37	+0.4										5.0	
Asheville	2,255	53	75	27.67	29.99	.00	61.0	−1.6	83	18	72	38	28	50	38	55	52	77	3.33	−0.2	16	5,551	se.	30	nw.	27	9	10	12	5.6	
Charlotte	773	68	76	29.18	30.00	+.01	66.8	−1.6	87	19	77	46	28	57	29	53	53	67	4.07	−0.3	12	5,196	sw.	35	w.	8	11	6	14	5.5	
Hatteras	11	12	47	30.01	30.02	+.01	65.2	−1.9	78	26	71	51	12	59	19	61	59	83	4.05	−0.6	9	10,587	sw.	47	n.	11	19	7	5	3.5	
Raleigh	376	71	79	29.61	30.00	+.01	66.0	−2.1	91	24	77	42	12	55	32	59	55	72	4.75	+0.3	15	4,971	sw.	25	s.	8	10	11	10	5.0	
Wilmington	78	81	91	29.93	30.01	.00	68.7	−0.4	86	19	78	49	12	60	24	63	60	78	5.52	+1.4	13	6,156	sw.	28	w.	8	8	17	6	4.9	
Charleston	48	14	92	29.95	30.00	−.01	72.0	−0.4	87	20	78	58	13	66	20	66	64	89	2.98	−1.0	15	8,083	s.	44	nw.	26	9	13	9	5.0	
Columbia, S. C.	351	41	57	29.62	29.99	−.01	70.5	−1.3	90	19	80	51	28	60	31	61	56	69	5.80	+1.9	13	5,266	sw.	29	nw.	8	9	7	15	5.6	
Augusta	180	89	97	29.80	29.99	.00	71.2	−1.0	89	18	81	51	17	61	34	62	58	71	5.33	+1.9	13	4,383	se.	31	nw.	6	10	12	9	4.9	
Savannah	65	81	89	29.93	30.00	.00	72.8	+0.3	89	20	80	56	17	65	25	65	62	77	2.48	−0.4	12	5,556	sw.	25	ne.	12	8	14	9	5.4	
Jacksonville	43	101	129	29.95	30.00	.00	74.8	+0.6	89	30	82	59	17	67	22	69	67	83	5.40	+1.4	11	6,464	e.	56	ne.	8	9	15	7	5.1	
Florida Peninsula.							78.7	+1.7										76	3.67	+0.1										4.0	
Jupiter	28	10	48	29.96	29.99	+.01	77.6	+1.2	89	28	84	63	12	71	20	73	70	80	4.58	−0.7	11	7,951	se.	32	sw.	11	4	24	3	5.1	
Key West	22	10	53	29.95	29.97	.00	80.7	+1.7	88	22	86	69	28	76	15	73	70	74	3.52	+0.4	8	6,565	e.	40	sw.	11	17	10	4	3.9	
Sand Key	25	41	71	29.93	29.96	−.01	79.3	...	88	2	82	66	28	76	20	...	...	...	2.95	...	8	9,254	e.	50	sw.	11	16	12	3	3.9	
Tampa	35	79	96	29.96	29.99	.00	77.7	+2.2	92	21	87	61	18	63	25	69	66	74	2.90	+0.5	7	5,833	ne.	29	n.	12	20	9	2	3.2	
East Gulf States.							70.1	−2.2										78	7.31	+3.3										6.4	
Atlanta	1,174	190	216	28.77	30.00	+.01	67.4	−2.1	85	23	76	45	28	59	27	60	56	71	3.59	+0.4	13	8,339	se.	42	sw.	3	8	8	15	6.2	
Macon	370	55	66	29.60	29.99	.00	71.6	+0.5	90	28	82	50	17	61	33	...	...	...	5.12	+2.4	11	3,234	s.	30	s.	15	10	9	12	5.7	
Thomasville	273	8	57	29.70	29.99	.00	73.6	−0.4	93	26	85	50	17	62	33	66	63	76	6.10	+2.5	7	3,654	s.	19	sw.	6	10	16	5	4.8	
Pensacola	56	79	96	29.92	29.98	.01	73.2	−1.6	87	21	79	59	28	67	18	...	...	...	5.33	+2.0	12	7,536	s.	50	s.	31	7	11	13	6.1	
Anniston	741	9	58	29.22	30.01	+.02	66.4	−2.0	86	23	77	42	28	56	36	...	...	...	7.30	+3.1	15	3,669	se.	30	nw.	6	5	9	17	7.2	
Birmingham	700	136	144	29.23	29.99	+.01	67.2	−4.4	85	19	76	44	28	59	26	61	58	76	10.54	+6.6	14	5,705	n.	35	sw.	14	3	15	13	7.0	
Mobile	57	98	106	29.91	29.97	−.02	72.2	−1.4	86	22	79	54	17	66	23	67	65	82	6.06	+1.7	13	6,355	se.	43	nw.	27	5	15	11	6.4	
Montgomery	223	100	112	29.75	30.00	+.01	69.8	−3.7	86	22	79	50	28	61	28	63	60	78	6.27	+2.2	14	4,581	nw.	39	n.	26	5	9	17	6.8	
Meridian	375	84	93	29.58	29.97	−.01	67.7	−3.4	85	28	77	47	16	58	32	63	60	80	8.44	+3.6	13	3,953	ne.	32	nw.	14	6	6	19	6.7	
Vicksburg	247	62	74	29.69	29.97	.00	68.2	−4.7	86	22	77	50	16	60	24	63	60	78	6.91	+2.0	15	4,821	se.	48	nw.	7	4	11	16	6.8	
New Orleans	51	88	121	29.90	29.95	−.02	73.8	−0.7	88	26	81	62	16	67	17	68	65	80	14.74	+9.8	14	7,061	se.	34	n.	9	3	10	18	7.2	
West Gulf States.							67.7	−5.0										79	6.33	+1.9										6.1	
Shreveport	249	77	84	29.67	29.94	−.01	68.0	−5.2	89	26	77	44	4	59	27	62	59	77	7.34	+3.2	15	5,552	se.	27	se.	25	11	8	12	5.7	
Bentonville	1,303	11	44	28.57	29.96	+.03	60.7	−5.7	84	17	71	34	4	50	33	...	...	...	5.83	...	15	4,383	s.	24	s.	13	13	6	12	5.4	T.
Fort Smith	457	79	94	29.45	29.92	−.01	63.6	−6.1	88	17	73	39	4	54	36	58	54	77	6.13	+1.4	14	6,041	e.	44	nw.	25	12	10	9	5.1	
Little Rock	357	93	100	29.58	29.95	.00	64.4	−6.0	84	17	73	45	4	56	32	59	55	75	10.30	+4.6	13	5,424	ne.	40	nw.	26	9	6	16	6.2	
Corpus Christi	20	48	53	29.86	29.88	−.02	73.8	−2.7	86	14	79	48	1	69	30	69	67	84	3.18	−0.1	11	9,255	se.	38	se.	25	5	10	16	6.6	
Fort Worth	670	106	114	29.21	29.92	+.01	65.8	−7.4	90	6	75	40	4	57	35	...	...	...	6.53	+1.6	12	6,279	se.	35	nw.	3	6	19	6	5.4	
Galveston	54	106	112	29.87	29.93	−.01	72.8	−2.6	83	26	77	56	1	68	19	69	67	85	6.80	+3.0	11	9,569	se.	48	n.	9	4	13	14	6.6	
Palestine	510	73	79	29.38	29.91	−.02	67.8	−4.7	88	26	77	44	4	58	26	62	59	79	5.74	−0.1	14	6,116	s.	35	nw.	7	5	6	20	7.2	
San Antonio	701	80	91	29.16	29.88	−.02	71.0	−3.8	88	24	80	45	4	62	33	64	60	76	4.64	+1.4	11	5,700	se.	56	nw.	8	6	12	13	6.0	
Taylor	583	55	63	29.29	29.90	−.01	69.0	−5.3	89	25	78	42	4	60	32	...	...	...	7.44	...	15	7,135	s.	38	e.	29	6	8	17	6.8	
Ohio Val. and Tenn.							60.3	−4.9										69	4.02	+0.1										5.6	
Chattanooga	762	106	112	29.20	30.01	+.02	65.8	−2.8	87	23	75	45	28	56	31	58	54	69	5.50	+1.6	15	5,087	s.	35	sw.	14	9	11	11	5.5	
Knoxville	1,004	35	88	28.94	29.98	−.01	64.2	−2.3	86	23	74	42	28	54	34	57	52	67	3.54	−0.4	16	5,182	sw.	34	sw.	14	9	7	15	6.0	
Memphis	399	76	97	29.56	29.98	+.02	64.4	−6.3	85	23	72	43	5	57	30	60	56	77	7.54	+3.0	13	6,721	sw.	52	w.	6	10	9	12	5.8	
Nashville	546	79	91	29.42	30.00	+.02	63.6	−5.2	88	23	73	37	5	54	39	57	52	72	6.01	+2.4	15	4,416	sw.	21	w.	15	7	8	16	6.5	
Lexington	989	75	102	28.95	30.01	+.02	59.1	−5.2	83	23	69	37	5	50	35	...	...	...	3.89	+0.4	16	6,996	sw.	36	nw.	27	20	5	6	3.7	
Louisville	525	111	132	29.42	30.00	+.02	62.0	−4.7	88	23	72	40	5	52	35	54	49	68	5.30	+1.6	14	5,754	s.	35	sw.	14	7	14	10	5.7	
Evansville	431	72	82	29.50	29.97	.00	60.8	−6.3	86	23	70	38	4	52	31	...	...	...	5.59	...	14	5,166	s.	36	sw.	26	7	21	3	5.2	
Indianapolis	822	154	164	29.10	29.99	+.02	56.8	−6.5	83	23	66	34	11	48	31	50	44	66	2.85	−1.3	12	7,109	ne.	36	se.	14	7	10	14	6.4	
Cincinnati	628	152	160	29.32	30.00	+.01	59.4	−5.7	86	23	69	37	11	50	33	53	47	67	2.49	−0.9	13	4,900	ne.	37	w.	19	7	11	13	6.1	
Columbus	824	173	190	29.13	30.00	+.02	55.7	−6.6	83	14	66	34	11	46	34	49	44	67	3.35	−0.9	12	8,097	sw.	42	nw.	3	9	10	12	5.8	
Pittsburg	842	336	352	29.10	30.00	+.01	56.4	−6.2	84	14	66	32	11	47	30	50	44	66	1.79	−1.6	13	7,160	nw.	50	nw.	4	9	9	13	6.0	
Parkersburg	638	77	84	29.35	30.00	−.01	59.6	−3.7	86	14	70	36	5	49	37	53	49	72	3.95	+0.6	14	4,105	n.	36	nw.	4	14	7	10	5.1	
Elkins	1,940	41	50	29.97	30.01	+.01	56.3	−2.8	87	14	79	29	12	44	43	50	45	70	3.21	−2.8	18	2,949	n.	24	w.	19	10	11	10	5.4	
Lower Lake Region.							50.2	−7.0										71	2.98	−0.4										5.5	
Buffalo	767	178	208	29.16	29.99	+.02	48.4	−6.1	79	14	56	29	11	40	31	44	39	73	3.73	+0.3	12	9,854	sw.	61	sw.	27	6	18	7	5.8	1.8
Canton	448	10	71	29.49	29.96	...	47.4	−8.8	84	15	58	26	5	37	38	...	...	...	2.43	...	9	9,178	w.	55	sw.	13	3	15	13	6.5	0.3
Oswego	335	76	91	29.62	29.99	+.02	48.2	−6.5	83	15	56	32	11	40	33	43	38	73	3.60	+0.8	12	7,089	w.	32	s.	15	9	11	11	5.3	1.0
Rochester	523	81	102	29.43	30.01	+.04	50.4	−6.3	86	15	60	30	12	41	31	44	39	69	2.84	−0.5	13	6,458	w.	40	sw.	27	10	10	11	5.4	1.3
Syracuse	597	97	113	29.35	29.99	+.01	50.6	−6.7	83	14	60	30	11	41	32	...	...	...	2.26	...	14	8,546	nw.	48	sw.	4	7	15	9	5.8	5.0
Erie	713	92	102	29.23	30.00	+.02	50.2	−7.1	83	14	58	31	10	42	32	45	40	70	3.34	−0.5	14	7,945	ne.	38	se.	25	10	12	9	5.6	0.5
Cleveland	762	190	201	29.18	30.01	+.03	51.1	−7.4	81	14	59	32	1	43	32	46	40	68	2.46	−1.2	13	10,955	n.	50	w.	27	8	16	7	5.4	0.7
Sandusky	629	62	70	29.32	30.01	+.03	52.1	−7.1	82	14	60	34	4	44	32	...	...	...	2.16	−1.3	13	6,364	sw.	32	w.	27	11	11	9	5.0	T.
Toledo	628	207	246	29.32	30.01	+.04	52.2	−7.5	82	14	61	30	11	43	32	48	43	74	3.05	−0.3	13	10,630	sw.	52	sw.	26	12	12	7	4.5	1.1
Detroit	730	153	193	29.21	30.01	+.04	51.1	−6.8	81	13	61	30	11	42	29	45	39	67	2.64	−0.9	11	8,130	sw.	36	w.	27	8	13	10	5.6	0.2
Upper Lake Region.							44.7	−7.5										70	2.52	−0.8										6.1	
Alpena	609	13	92	29.33	30.00	+.03	43.2	−6.3	81	13	52	25	1	34	40	38	33	70	2.47	−1.0	11	7,545	se.	34	se.	12	9	8	14	6.2	2.5
Escanaba	612	40	82	29.33	30.01	+.04	41.6	−8.4	64	17	49	22	4	34	24	37	31	68	2.05	−1.3	11	7,565	s.	32	n.	27	11	14	6	5.3	1.6
Grand Haven	632	54	92	29.30	29.99	+.03	47.6	−7.2	78	14	56	27	11	39	28	42	37	71	2.36	−1.1	11	8,897	s.	38	nw.	27	7	14	10	5.9	0.2

TABLE I.—*Climatological data for U. S. Weather Bureau stations, May, 1907*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.													Precipitation, in inches.			Wind.								
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity: Miles per hour.	Maximum velocity: Direction.	Maximum velocity: Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
Up. Lake Reg—Cont.																															
Grand Rapids	707	121	162	29.22	30.00	+ .03	50.7	− 8.3	82	13	60	28	11	41	31	44	38	66	2.49	− 1.0	10	8,112	sw.	38	sw.	13	6	15	10	6.1	T.
Houghton	668	66	74	29.26	30.00	+ .03	40.0	− 9.7	65	31	48	23	8	32	33	....	....	....	3.52	......	15	5,940	e.	28	n.	26	5	17	9	6.2	1.8
Marquette	734	77	116	29.20	30.02	+ .05	39.8	− 9.2	58	16	46	24	3	33	27	35	29	68	3.13	+ 0.2	14	7,124	nw.	34	nw.	27	5	16	10	6.3	3.0
Port Huron	638	70	120	29.30	30.00	+ .03	48.2	− 5.5	80	13	58	29	11	39	34	43	38	72	2.00	− 1.4	12	8,191	ne.	37	w.	27	12	11	8	5.0	1.0
Sault Ste. Marie	614	40	61	29.31	30.02	+ .07	40.4	− 7.3	67	31	48	24	1	33	28	36	32	74	2.41	+ 0.2	13	7,261	nw.	40	nw.	9	6	9	16	6.9	2.2
Chicago	823	140	310	29.10	30.00	+ .04	51.6	− 4.9	83	13	59	34	3	44	34	46	42	73	3.50	− 0.2	9	11,162	ne.	40	sw.	12	10	9	12	6.0	1.3
Milwaukee	681	122	138	29.27	30.01	+ .05	48.2	− 5.4	83	13	56	31	11	40	39	42	36	68	3.14	− 0.4	11	8,278	n.	34	s.	12	13	7	11	5.5	T.
Green Bay	617	49	86	29.30	29.96	+ .01	46.8	− 7.7	80	13	56	27	4	38	39	41	36	68	2.54	− 0.8	9	8,796	ne.	37	ne.	13	3	13	15	7.2	0.6
Duluth	1,133	11	47	28.76	30.00	+ .04	38.8	− 9.8	65	17	46	16	3	31	31	34	28	67	1.60	− 2.1	10	11,459	ne.	48	ne.	13	4	12	15	6.3	2.2
North Dakota.							43.3	−10.4										65	1.71	− 0.7										6.0	
Moorhead	940	8	57	28.99	30.03	+ .09	44.8	−10.0	80	28	56	17	2	34	39	40	36	75	2.03	− 0.5	12	7,249	ne.	35	se.	11	4	14	13	6.2	4.2
Bismarck	1,674	8	57	28.24	30.04	+ .12	45.4	− 9.8	77	28	58	13	3	32	46	38	29	59	1.98	− 0.5	11	8,675	n.	38	n.	1	10	10	11	5.6	3.9
Devils Lake	1,482	11	44	28.42	30.02	+ .08	41.8	−10.9	73	31	56	6	2	28	46	36	31	69	0.35	......	6	10,464	n.	48	n.	25	9	13	9	5.3	1.3
Williston	1,875	14	44	28.02	30.03	+ .10	43.2	−11.1	76	15	55	15	14	31	42	37	28	58	1.11	− 1.0	7	8,300	n.	37	n.	8	5	10	16	6.7	0.9
Upper Miss. Valley.							54.3	− 7.6										69	3.24	− 0.9										6.0	
Minneapolis	......	102	208	......	......	......	46.8	......	85	12	55	22	3	38	40	....	....	....	2.01	− 1.7	11	9,798	nw.	40	n.	26	6	10	15	6.9	0.8
St. Paul	837	171	179	29.05	29.97	+ .03	47.4	−10.8	84	12	56	23	3	39	37	41	34	62	1.27	− 2.1	10	8,160	n.	35	n.	26	6	12	13	6.6	0.4
La Crosse	714	71	87	29.19	29.97	+ .03	50.8	− 8.7	84	12	60	27	4	41	39	....	....	....	2.30	− 1.0	13	6,140	s.	31	n.	26	4	9	18	7.3	T.
Madison	974	70	78	28.92	29.97	+ .01	49.0	− 8.6	79	13	58	28	4	40	42	44	39	72	2.69	− 0.8	10	7,714	s.	41	s.	12	9	8	14	6.2	0.2
Charles City	1,015	8	58	28.88	29.97	+ .03	49.7	− 9.8	84	12	61	20	4	38	43	45	39	70	2.11	− 1.9	15	6,462	n.	31	s.	12	4	12	15	6.9	0.4
Davenport	606	71	79	29.30	29.96	+ .01	54.8	− 6.7	82	13	65	29	4	45	33	49	44	70	4.33	0.0	10	6,015	e.	31	s.	12	9	9	13	5.7	T.
Des Moines	861	84	101	29.05	29.96	+ .03	54.2	− 7.4	84	12	64	26	4	44	41	47	41	65	3.97	− 0.7	14	6,733	sw.	47	sw.	12	4	14	13	6.6	1.3
Dubuque	698	100	117	29.23	29.98	+ .03	52.7	− 8.1	80	13	63	29	4	43	40	46	39	65	2.66	− 1.3	10	5,294	s.	28	s.	12	6	13	12	6.1	T.
Keokuk	614	64	77	29.29	29.96	+ .02	57.5	− 5.7	84	23	68	28	4	47	34	50	45	71	3.44	− 0.6	11	5,061	s.	25	nw.	26	18	6	7	3.7	T.
Cairo	356	87	93	29.59	29.97	+ .01	61.8	− 5.7	86	23	70	39	4	54	26	57	53	76	6.78	+ 3.0	13	6,430	s.	48	w.	26	11	5	15	5.6	
La Salle	536	56	64	29.42	30.00	......	53.8	− 7.0	83	13	65	30	11	43	39	....	....	....	8.39	......	11	6,561	ne.	29	sw.	12	7	11	13	6.2	0.3
Peoria	609	11	45	29.31	29.98	+ .02	55.1	− 6.6	83	13	66	29	1	44	34	49	44	69	2.08	......	12	6,616	s.	43	w.	26	8	14	9	5.2	T.
Springfield, Ill.	644	10	92	29.28	29.97	+ .02	57.2	− 6.3	86	23	68	32	1	47	32	51	47	70	2.94	− 2.0	14	6,646	s.	33	sw.	14	11	6	14	5.7	
Hannibal	534	75	109	29.39	29.97	+ .03	57.6	− 6.8	85	13	67	30	4	48	31	....	....	....	2.09	− 3.3	12	6,938	ne.	33	w.	26	10	11	10	5.7	T.
St. Louis	567	208	217	29.35	29.95	.00	58.9	− 7.6	86	25	68	35	11	50	31	53	48	71	5.57	+ 1.0	11	7,752	se.	39	nw.	26	9	10	12	5.4	
Missouri Valley.							54.9	− 7.1										65	3.51	− 0.4										5.9	
Columbia, Mo.	784	11	84	29.10	29.98	− .01	59.0	− 5.5	88	17	70	28	4	48	34	....	....	....	4.05	− 0.9	11	5,777	se.	31	nw.	26	17	3	11	4.8	
Kansas City	963	78	95	28.94	29.97	+ .05	58.6	− 5.9	89	17	68	27	4	49	34	52	46	67	4.13	− 0.5	9	5,238	se.	48	nw.	13	10	12	9	5.2	1.7
Springfield, Mo	1,324	98	104	28.54	29.94	+ .01	58.9	− 5.7	87	17	69	31	4	49	33	52	49	76	7.47	+ 1.5	14	7,648	se.	31	s.	13	14	8	9	4.6	
Iola	984	40	47	28.90	29.94	+ .02	58.8	− 5.7	87	17	69	28	4	49	34	....	....	....	3.97	......	11	6,430	s.	30	sw.	12	7	12	12	6.1	
Topeka	......	85	89	......	......	......	58.6	− 6.4	92	17	69	28	4	48	41	....	....	....	1.87	− 3.1	10	7,544	s.	40	s.	12	15	6	10	4.6	3.2
Lincoln	1,189	11	84	28.65	29.92	− .01	56.2	− 6.7	93	22	68	26	3	44	49	48	40	60	3.19	− 1.2	12	9,682	s.	52	n.	17	9	10	12	6.1	2.5
Omaha	1,105	115	121	28.76	29.94	+ .02	55.4	− 7.1	87	12	66	26	3	45	45	47	40	60	1.58	− 2.8	13	7,734	n.	36	n.	2	5	9	17	7.4	1.3
Valentine	2,598	47	54	27.23	29.95	+ .05	49.8	− 8.1	88	11	62	24	14	38	48	43	36	66	2.35	− 0.5	15	9,270	n.	37	nw.	16	4	17	10	6.0	1.4
Sioux City	1,135	96	164	28.74	29.96	+ .04	52.6	− 8.2	90	12	64	28	3	42	47	....	....	....	2.48	− 1.2	10	11,082	ne.	52	s.	12	6	8	17	6.8	0.7
Pierre	1,572	70	75	28.31	29.98	+ .07	50.4	− 8.9	82	16	61	25	3	40	42	43	35	62	3.42	+ 1.1	13	9,019	nw.	55	e.	25	6	16	9	5.9	1.6
Huron	1,306	56	67	28.58	29.99	+ .07	48.1	− 9.2	80	16	59	20	3	37	42	42	35	65	3.58	+ 0.6	13	9,468	n.	42	se.	11	10	10	11	5.6	4.2
Yankton	1,233	49	57	28.62	29.94	+ .02	51.9	− 8.1	93	12	63	27	3	41	44	....	....	....	4.45	+ 0.1	11	7,145	ne.	37	nw.	12	4	2	25	7.9	0.6
Northern Slope.							48.2	− 4.8										66	3.12	+ 1.0										6.1	
Havre	2,505	11	44	27.36	30.00	+ .10	48.6	− 5.5	78	15	59	23	2	38	38	42	37	68	1.87	+ 0.3	11	5,890	e.	26	w.	15	7	14	10	5.7	T.
Miles City	2,371	26	48	27.47	30.03	+ .12	50.5	− 6.2	79	15	62	21	2	38	38	43	37	64	4.39	+ 2.1	14	5,052	ne.	30	e.	20	9	10	12	6.0	0.3
Helena	4,110	8	56	25.70	29.99	+ .06	49.2	− 2.4	76	31	59	26	4	39	30	41	35	64	1.04	− 0.6	11	4,939	nw.	36	sw.	16	6	7	18	7.3	1.0
Kalispell	2,962	8	34	26.86	29.94	+ .06	51.6	+ 0.6	80	15	65	29	4	38	39	43	35	60	1.06	......	9	3,964	nw.	26	nw.	15	7	20	4	5.1	T.
Rapid City	3,234	46	50	26.58	30.01	+ .11	47.4	− 6.8	78	16	57	24	2	37	36	42	37	70	8.09	+ 4.5	12	6,383	nw.	30	nw.	12	9	15	7	5.5	1.2
Cheyenne	6,088	56	64	23.95	29.92	+ .07	45.4	− 5.6	80	21	56	8	3	34	38	39	34	72	2.78	+ 0.5	15	7,413	n.	40	nw.	25	5	11	15	6.5	9.4
Lander	5,372	26	36	24.60	29.94	+ .06	46.3	− 5.7	76	21	59	18	3	34	37	40	33	66	2.67	+ 0.4	12	3,076	sw.	26	sw.	17	4	15	12	6.6	15.8
Sheridan	3,790	5		26.07	29.97	......	47.4	......	77	10	58	23	3	36	42								nw.	....	....	....	4	12	15	7.0	2.2
Yellowstone Park	6,200	11	48	23.82	29.94	+ .03	42.6	− 4.8	69	31	53	20	5	32	33	35	29	66	2.16	......	17	6,078	nw.	30	s.	10	5	20	6	5.3	7.3
North Platte	2,821	11	51	27.01	29.94	+ .06	52.6	− 6.4	89	21	66	20	3	39	49	45	39	67	2.40	− 0.3	13	7,364	n.	60	sw.	20	10	7	14	5.7	4.3
Middle Slope.							56.5	− 6.4										65	3.00	− 0.6										5.7	
Denver	5,291	129	136	24.67	29.91	+ .07	50.3	− 6.4	86	20	61	19	3	40	36	41	33	59	2.93	+ 0.1	16	5,661	n.	40	ne.	12	6	14	11	6.5	9.0
Pueblo	4,685	80	86	25.21	29.87	+ .04	54.4	− 5.1	87	21	66	29	1	43	39	44	35	59	1.69	− 0.2	12	5,629	se.	34	sw.	12	10	10	11	5.4	T.
Concordia	1,398	42	47	28.46	29.93	+ .03	57.8	− 5.9	92	22	70	26	15	46	53	50	43	62	1.67	− 2.4	8	6,599	s.	35	s.	12	10	12	9	5.2	3.7
Dodge	2,509	44	54	27.32	29.91	+ .04	57.1	− 6.4	92	17	70	27	3	45	44	48	42	65	2.01	− 1.2	12	6,863	se.	41	w.	25	12	11	8	5.3	
Wichita	1,358	78	86	28.52	29.89	+ .05	59.1	− 6.8	90	17	70	28	4	49	38	52	46	67	4.12	− 0.2	10	6,807	se.	35	s.	12	7	12	12	5.9	T.
Oklahoma	1,214	10	47	28.64	29.91	+ .02	60.5	− 7.6	90	17	70	34	4	51	37	55	52	79	5.60	+ 0.1	10	11,816	s.	54	nw.	14	9	9	13	6.0	
Southern Slope.							60.3	− 5.3										60	2.09	− 0.5										5.0	
Abilene	1,738	45	54	28.11	29.89	+ .02	65.6	− 6.3	95	25	76	33	4	55	37	57	51	65	4.13	+ 0.6	8	6,921	n.	40	nw.	29	6	16	9	3.9	
Amarillo	3,676	10	49	26.19	29.87	+ .03	59.0	− 5.3	90	17	72	26	4	46	40	49	42	64	0.99	− 2.2	9	10,260	nw.	44	s.	12	20	8	3	3.8	
Del Rio	944	8	57	28.88	29.85	.00	73.9	− 3.0	102	13	87	51	1	61	41	....	....	....	3.22	......		6,555	se.	40	nw.	7	8	13	10	5.7	
Roswell	3,578	9	57	26.23	29.81	− .01	62.8	− 6.6	88	23	79	36	15	47	48	50	38	50	1.15	0.0	5	5,350	s.	32	nw.	9	11	14	6	4.7	
Southern Plateau.							61.7	− 4.2										30	0.53	0.0										2.9	
El Paso	3,762	10	110	26.08	29.78	.00	67.5	− 4.6	90	22	81	45	1	54	38	48	24	28	0.10	0.4	2	9,337	w.	48	w.	13	21	7	3	2.8	
Santa Fe	7,013	33	39	23.19	29.83	+ .02	49.4	− 7.3	75	21	61	26	15	38	36	39	30	51	1.92	+ 0.9	12	5,829	sw.	38	se.	27	12	12	7	4.4	0.4
Flagstaff	6,907	12	44	23.28	29.80	+ .02	46.6	− 4.1	74	19	61	24	14	32	41	36	25	52	0.67	− 0.5	7	6,670	sw.	38	sw.	4	11	11	9	4.4	T.
Phoenix	1,108	50	56	28.65	29.79	+ .01	72.4	− 2.4	101	20	87	48	2	58	41	52	30	28	0.27	+ 0.1	1	3,869	e.	25	sw.	4	21	8	2	2.5	
Yuma	141	16	46	29.65	29.80	+ .01	73.0	− 3.8	101	20	89	49	13	57	41	56	41	38	0.00	0.0	0	5,444	w.	40	nw.	11	28	3	0	0.8	
Independence	3,910	11	42	25.88	29.83	− .01	61.2	− 3.3	88	31	75	38	1	48	36	46	31	36	0.01	− 0.3	1	6,518	n.	40	n.	8	23	6	2	2.3	
Middle Plateau.							53.0	− 2.6										51	1.46	+ 0.5										4.8	
Reno	4,532	56	63	25.42	29.90	− .01	53.3	− 0.6	85	31	67	31	5	40	39	44	36	60	0.50	0.0	6	4,893	w.	30	sw.	11	16	9	6	4.0	T.
Tonopah	6,089	12	20	23.98	29.88	......	52.4	+ 0.5	79	31	63	28	12	41	34	40	27	43	0.20	......	5	7,970	nw.	44	nw.	11	13	17	1	4.6	T.
Winnemucca	4,344	18	56	25.54	29.91	.00	53.5	− 0.9	84	31	68	28	2	39	40	42	32	53	0.56	− 0.4	7	4,437	ne.	36	ne.	4	19	6	6	3.2	T.
Modena	5,479	10	43	24.51	29.82	.00	51.1	− 3.4	78	19	65	26	1	37	38	40	29	51	1.71	+ 1.0	7	9,531	sw.	58	sw.	11	8	9	14	5.5	0.3
Salt Lake City	4,366	105	110	25.50	29.81	− .02	55.6	− 2.7	83	19	66	34	2	45	34	44	32	46	2.87	+ 1.2	13	5,785	nw.	48	nw.	11	12	11	8	4.8	
Durango	6,546	18	56	23.56	29.82	.00	49.0	− 6.0	77	20	62	27	3	36	39	38	28	54	1.94	+ 0.8	13	4,769	nw.	38	s.	12	7	14	10	6.3	0.3
Grand Junction	4,608	48	51	25.27	29.82	− .01	56.4	− 5.2	85	19	69	29	14	44	36	44	31	47	1.21	+ 0.6	8	4,499	se.	29	sw.	12	9	7	15	5.9	
Northern Plateau.							57.8	+ 0.9										50	1.05	− 0.6										4.6	
Baker City	3,471	48	58	26.38	29.95	− .01	53.7	+ 3.0	85	31	66	32	21	41	37	43	33	52	0.51	− 1.4	9	5,792	nw.	28	nw.	12	15	8	8	4.4	
Boise	2,739	78	86	27.07	29.90	− .04	58.0	+ 0.4	84	31	71	36	2	45	34	46	33	44	0.06	− 1.6	3	5,268	nw.	35	nw.	12	13	13	5	4.5	
Lewiston	757	10	51	29.12	29.93	− .03	61.4	+ 0.6	92	31	75	38	4	47	40	....	....	....	1.03	− 0.8	5	4,255	e.	62	w.	10	12	10	9	4.8	
Pocatello	4,477	46	54	25.40	29.89	.00	53.2	− 2.3	79	19	65	30	5	42	36	42	31	51	1.01	− 0.2	7	6,097	se.	32	sw.	22	11	17	3	4.6	
Spokane	1,929	101	110	27.90	29.94	− .02	57.4	+ 1.3	86	31	70	34	5	44	37	47	37	55	2.60	+ 1.2	6	4,335	nw.	24	s.	8	4	23	4	5.6	
Walla Walla	1,000	71	79	28.88	29.94	− .02	63.0	+ 2.3	93	31	75	42	5	51	35	52	43	50	1.07	− 0.6	8	4,342	s.	31	w.	10	16	14	1	3.8	
N. Pac. Coast Reg.							54.7	+ 1.6										76	1.38	− 1.4										6.0	
North Head	211	11	56	29.81	30.04	+ .01	51.8	+ 0.6	65	30	55	44	2	49	12	49	47	85	1.39	− 1.8	8	11,195	nw.	70	se.	9	5	10	16	6.8	
Port Crescent	259	12	29	29.76	30.04	+ .02	49.2	+ 0.1	70	30	57	32	1	42	28	....	....	....	1.09	− 1.4	6	3,565	nw.	14	w.	31	8	11	12	6.1	
Seattle	123	185	224	29.91	30.04	+ .03	57.0	+ 2.0	82	30	66	42	1	48	30	51	45	70	0.98	− 1.4	4	5,256	w.	44	sw.	19	9	15	7	5.4	
Tacoma	213	113	120	29.80	30.03	+ .01	57.4	+ 2.9	86	30	67	38	1	48	35	....	....	....	0.97	− 1.5	5	3,805	n.	27	sw.	10	9	11	11	5.5	
Tatoosh Island	86	7	57	29.94	30.04	+ .03	51.0	+ 1.4	66	30	55	44	1	47	17	49	46	86	2.61	− 2.0	8	7,442	sw.	48	s.	9	3	8	20	7.9	
Portland, Oreg.	153	68	106	29.85	30.01	− .02	59.2	+ 2.4	93	30	69	41	2	49	38	52	46	67	1.37	− 1.0	7	4,099	nw.	21	sw.	10	12	15	4	4.5	
Roseburg	510	9	57	29.47	30.02	+ .01	57.6	+ 1.6	93	30	71	32	1	44	46	50	45	70	1.26	− 0.7	10	2,490	n.	20	sw.	21	9	9	13	5.6	

TABLE I.—*Climatological data for U. S. Weather Bureau stations, May, 1907*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.													Precipitation, in inches.			Wind.									
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity: Miles per hour.	Maximum velocity: Direction.	Maximum velocity: Date.	Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness during daylight, tenths.	Total snowfall.
Mid. Pac. Coast Reg.							59.2	— 0.3										70	0.54	— 1.0										4.9	
Eureka	62	62	80	29.99	30.06	+ .01	53.0	+ 0.9	64	18	57	46	4	49	14	50	47	82	1.69	— 1.1	10	5,477	nw.	36	n.	3	5	10	16	6.5	
Mount Tamalpais	2,375	11	18	27.52	30.00	.00	54.2	....	80	27	61	39	12	47	21	47	41	70	0.35	....	9	13,167	nw.	76	nw.	3	16	7	8	4.3	
Point Reyes Light	490	7	18	29.44	29.96	....	52.6	....	61	19	56	46	1	49	11	....	....	....	0.11	— 1.8	5	16,523	nw.	84	nw.	3	6	8	17	6.8	
Red Bluff	332	50	56	29.57	29.92	— .03	64.8	— 1.7	92	29	76	45	12	54	34	55	46	57	0.75	— 0.6	6	4,567	nw.	25	n.	4	13	9	9	4.4	
Sacramento	69	106	117	29.87	29.94	.00	63.0	+ 0.1	90	29	73	47	4	53	31	54	47	61	0.10	— 0.9	2	7,102	s.	34	nw.	3	21	9	1	2.5	
San Francisco	155	200	204	29.83	30.00	+ .01	56.4	+ 0.9	80	26	62	47	2	50	28	51	48	79	0.04	— 0.7	4	6,369	w.	31	w.	27	10	17	4	4.4	
San Jose	141	78	88	29.84	29.99	.....	59.0	— 1.7	86	26	71	39	8	47	40	...	....	....	0.08	....	3	....	nw.	...	....	...	15	9	7	4.0	
Southeast Farallon	30	9	17	29.98	30.01	....	53.4	....	61	19	56	48	15	51	9	....	...	....	0.25	......	6	11,219	nw.	54	nw.	3	6	13	12	6.8	
S. Pac. Coast Reg.							61.1	— 0.4										69	0.06	— 0.3										3.5	
Fresno	330	67	70	29.57	29.93	+ .01	66.0	— 2.4	93	29	80	42	12	52	38	52	41	48	T.	— 0.4	0	5,108	nw.	24	nw.	22	25	2	4	2.2	
Los Angeles	338	116	123	29.58	29.94	— .01	61.4	+ 0.9	84	15	70	47	7	52	31	54	50	74	0.07	— 0.4	2	4,263	sw.	28	sw.	12	11	12	8	4.7	
San Diego	87	94	102	29.85	29.94	— .01	60.8	0.0	73	15	66	51	14	56	18	55	52	74	0.07	— 0.3	1	4,847	nw.	22	nw.	15	27	3	1	2.7	
San Luis Obispo	201	47	54	29.79	30.01	+ .01	56.3	— 0.4	82	14	66	37	4	47	38	51	48	81	0.11	— 0.2	2	4,587	nw.	22	sw.	12	17	6	8	4.3	
West Indies.																															
Grand Turk	11	6	20	29.98	29.99	— .01	79.9	....	90	30	87	63	1	78	....	....	....	...	2.34	....	11	....	se.	30	n.	1	...	...	...	....	
San Juan	82	48	90	29.90	29.98	— .01	77.9	— 1.5	88	29	83	71	28	73	16	73	70	78	4.97	+ 0.3	15	8,633	e.	29	se.	20	13	13	5	4.2	
Panama.																															
Ancon	74	....	....	....	29.84	....	81.2	....	96	5	90	70	27	74	22	....	....	....	4.44	....	14	....	....	...	....	...	0	9	22	....	
Bas Obispo	40	....	....	....	29.86	....	79.4	....	90	2	86	68	27	72	19	....	....	....	6.02	....	19	3,463	nw.	17	nw.	1	0	15	16	....	

TABLE II.—*Climatological record of cooperative observers, May, 1907.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Alaga	.....	.....	.....	4.14	
Ashville	92	44	65.8	10.74	
Auburn	86	48	69.6	4.85	
Bermuda	90	45	70.1	8.57	
Boligee	87	46	68.5	9.33	
Bridgeport	.....	.....	.....	7.01	
Burkeville	.....	.....	.....	7.38	
Camp Hill	91	47	69.4	5.82	
Cedar Bluff	.....	.....	.....	8.21	
Citronelle	88	50	71.4	13.10	
Clanton	87	44	68.0	8.44	
Cordova	88	41	66.7	10.06	
Dadeville	.....	.....	.....	4.66	
Decatur	90	42	65.2	8.44	
Demopolis	.....	.....	.....	13.45	
Eufaula	86	48	70.0	3.35	
Evergreen	92	47	71.4	7.86	
Flomaton	90	47	72.0	9.03	
Florence	89	40	64.7	7.19	
Fort Deposit	89	49	71.0	7.10	
Gadsden	89	45	67.8	7.93	
Goodwater	88	44	69.4	7.45	
Greensboro	85	49	69.3	8.73	
Guntersville	.....	.....	.....	7.17	
Hamilton	86	38	64.7	7.64	
Highland Home	90	49	71.1	7.81	
Letohatchie	.....	.....	.....	2.90	
Livingston	87	49	67.8	10.70	
Lock No. 4	86	43	67.0	8.82	
Lucy	89	46	70.1	6.35	
Madison Station	87	41	65.2	8.35	
Milstead	.....	.....	.....	6.74	
Newbern	87	47	68.5	10.55	
Oneonta	85	41	65.3	10.17	
Opelika	88	46	70.2	4.49	
Ozark	89	44	68.7	3.22	
Prattville	88	45	68.8	6.93	
Pushmataha	88	46	68.4	15.16	
Riverton	88	39	63.8	10.23	
Scottsboro	86	41	64.4	6.22	
Selma	90	47	70.0	8.80	
Spring Hill	88	58	73.4	10.70	
Talladega	87	44	67.6	8.89	
Tallassee	.....	.....	.....	6.08	
Thomasville	87	48	68.6	8.76	
Tuscaloosa	89	45	66.9	9.15	
Tuscumbia	89	45	65.2	6.95	
Tuskegee	88	47	71.6	5.20	
Union Springs	86	50	70.5	5.87	
Uniontown	87	47	69.3	8.59	
Valleyhead	88	37	64.8	6.94	
Vienna	.....	.....	.....	7.92	
Wetumpka	88	46	70.0	5.67	
Alaska.					
Chestochina	87	21	50.2	T.	
Copper Center	85	31	53.4		
Alaska—Cont'd.	°	°	°	*Ins.*	*Ins.*
Fort Egbert	82	21	49.8	0.40	0.5
Juneau	76	34	52.5	3.93	
Killisnoo	65	31	47.1	1.60	
North Fork	78	22	45.0	1.34	4.0
St. Michael	55	20	37.0	0.21	2.0
Sitka	72	31	49.6	3.84	
Skagway	77	30	52.2	0.92	
Teikhill	76	21	47.6	0.80	
Tonsina	80	22	50.9	.....	
Arizona.					
Allaire Ranch	.....	.....	.....	0.58	
Arizona Canal Co. Dam	102	45	72.7	0.34	
Aztec	110	50	82.4	0.52	
Bisbee	84	42	61.2	1.67	
Bonita	.....	.....	.....	0.53	
Bowie	98	38	66.3	0.56	
Buckeye	103	40	70.5	0.50	
Casa Grande	106	47	76.4	T.	
Chiarsons Mill	68	20	42.0	2.00	1.0
Clifton	.....	.....	.....	1.20	
Cline	94	40	65.4	0.65	
Cochise*1	90	54	75.1	0.50	
Columbia	100	40	68.2	0.90	
Congress	92	48	68.8	0.05	
Douglas	96	38	65.0	0.99	
Dudleyville	96	41	65.4	1.60	
Fish Creek	.....	.....	.....	2.05	
Fort Apache	89	30	59.3	1.24	
Fort Huachuca	88	32	59.8	1.80	
Fort Mohave	104	52	78.8	T.	
Fredonia	86	20	50.4	1.30	
Gilabend	99	50	73.6	0.02	
Globe	93	41	63.4	0.83	
Grand Canyon	73	26	51.7	2.04	3.0
Greaterville	91	38	61.5	0.53	
Greer	.....	.....	.....	2.01	2.0
Holbrook	91	32	57.8	0.73	2.0
Huachuca Reservoir	.....	.....	.....	2.44	
Intake	.....	.....	.....	1.28	
Jerome	94	39	63.6	0.60	
Keams Canyon	80	28	51.7	0.59	T.
Kingman	94	35	63.2	0.31	
Maricopa	106	44	69.8	0.29	
Mesa	103	46	72.6	0.56	
Mohawk Summit	107	60	82.6	0.37	
Natural Bridge	.....	.....	.....	0.83	
Nutrioso	.....	.....	.....	0.69	2.0
Oracle	90	38	66.0	1.36	
Parker	104	41	71.1	0.00	
Phoenix (Ex. Farm)	101	46	71.8	0.22	
Picacho	102	70	82.4	0.50	
Pinal Ranch	.....	.....	.....	0.70	
Pinto	.....	.....	.....	0.08	
Prescott	87	26	54.6	0.35	
Roosevelt	99	47	64.0	0.72	
St. Johns	84	28	55.4	1.50	
Arizona—Cont'd.	°	°	°	*Ins.*	*Ins.*
St. Michaels	80	25	49.6	0.34	T.
San Carlos	98	38	66.4	1.58	
San Simon	97	34	62.8	1.05	
Seligman	84	29	53.9	0.02	
Sentinel	104	40	73.8	T.	
Tempe	102	42	71.1	0.48	
Tucson	101	42	70.8	0.43	
Upper San Pedro	94	32	61.2	1.25	
Vail	98	50	71.8	0.02	
Walnut Grove	.....	.....	.....	0.00	
Willcox	91	32	60.5	1.00	
Williams	77	24	49.4	1.69	1.5
Yarnell	.....	.....	.....	0.25	
Arkansas.					
Alicia	85	40	62.8	11.85	
Amity	84	40	64.2	8.99	
Arkadelphia	87[k]	41[k]	65.4[k]	9.99	
Arkansas City	.....	.....	.....	11.17	
Batesville	89	39	63.2	12.25	
Beebranch	84	41	62.6	8.15	
Benton	90	42	66.4	12.28	
Bergman	86	31	58.2	9.01	
Camden	85	42	66.0	7.76	
Center Point	89	39	66.6	11.30	
Clarendon	.....	.....	.....	10.88	
Conway	86	42	63.5	10.37	
Corning	86	41	63.4	8.57	
Des Arc	90[e]	43[b]	63.3[e]	9.20	
Dodd City	91	36	61.9	6.39	
Dutton	81	34	59.4	8.89	
Eldorado	90[e]	44	66.6[b]	10.70	
England	87[b]	44[e]	67.4[d]	9.73	
Eureka Springs	88	35	62.0	5.61	
Fayetteville	83	33	62.0	7.26	
Forrest City	87	41	64.0	10.30	
Fulton	.....	.....	.....	8.12	
Hardy	86	39	61.4	9.23	
Heber	88	34	63.4	9.13	
Helena	87	44	66.5	9.18	
Hope	91	38	67.0	8.52	
Hot Springs	85	37	63.4	12.09	
Jonesboro	89	36	62.6	7.82	
Junction	91	42	66.8	7.95	
La Crosse	86	39	62.9	9.74	
Lewisville	88[e]	39[e]	67.4[e]	8.44	
Lutherville	85	37	62.0	9.27	
Luxora	.....	.....	.....	4.80	
Malvern	83	41	62.0	8.05	
Mammoth Springs	87	37	60.8	10.09	
Marked Tree	.....	.....	.....	7.36	
Marvell	86	43	65.8	12.86	
Mena	84	40	63.8	11.91	
Montrose	88	45	66.5	7.40	
Mossvilld	80	34	59.3	12.19	
Mount Nebo	82	36	60.8	11.16	
Newport	88	41	63.9	7.52	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Arkansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Ozark	88	38	62.5	11.42	
Pinebluff	87	43	65.2	10.25	
Pocahontas	88	42	64.4	9.35	
Pond	86	31	60.4	7.57	
Prescott	87	40	65.7	10.75	
Princeton	87	39	65.9	10.66	
Rogers	83	33	60.6	5.79	
Russellville	89	41	64.2	9.80	
Spielerville	89	40[a]	63.9[b]	8.76	
Stuttgart	85	41	64.8	9.70	
Texarkana	90	43	59.8	8.61	
Warren	89	41	66.5	10.31	
Wiggs	85	35	62.8	11.25	
Winchester	.....	.....	.....	10.25	
Witts Springs	.....	.....	.....	11.45	
California.					
Alturas	86	23	52.6	1.21	
Angiola	93	28	61.6	0.00	
Auburn	86	37	57.8	0.34	
Azusa	89	38	60.5	0.09	
Bagdad	101	57	77.2	0.00	
Bakersfield	97	34	65.2	0.00	
Bear Valley	.....	.....	.....	2.62	2.0
Berkeley	85	46	58.5	0.04	
Bishop	87	32	57.8	0.14	
Blocksburg	86	35	55.4	2.74	
Blue Canyon	77	10	52.2	4.52	
Boca	.....	.....	.....	0.70	
Branscomb	85	32	53.3	3.27	
Brush Creek	90	34	57.4	1.05	
Butte Valley	.....	.....	.....	2.09	1.0
Calexico	100	54	78.8	0.31	
Caliente	89	53	67.6	0.03	
Campbell	87	36	58.0	0.10	
Campo	.....	.....	.....	0.41	
Cedarville	90	28	52.4	1.28	T.
Chico	95	41	64.1	0.13	
Cisco	72	29	48.5	0.70	7.0
Claremont	92	40	62.3	0.08	
Cloverdale	95	40	62.3	0.33	
Colfax	92	38	64.5	0.52	
Colusa	91	42	67.4	0.10	
Craf onville	.....	.....	.....	0.79	
Crescent City	75	39	52.9	2.94	
Crockers	.....	.....	.....	1.54	T.
Cuyamaca	68	29	48.1	0.64	
Delta	100	40	60.4	1.48	
Dimond	.....	.....	.....	0.10	
Dobbins	100	40	65.2	1.30	
Durham	91	41	64.0	0.15	
Elcajon	93	42	63.6	0.20	
Electra	92	47	65.5	0.76	
Elmwood	96	40	64.0	T.	
Elsinore	98	38	64.8	0.04	
Emigrant Gap	81	19	48.3	3.05	2.0
Escondido	88	35	61.4	0.09	
Folsom	98	43	65.1	0.63	
Fordyce	.....	.....	.....	3.64	7.0
Fort Ross	79	43	55.2	1.19	
Georgetown	89	35	57.3	1.29	
Gold Run	80	30	55.6	0.50	
Grass Valley	.....	.....	.....	0.74	
Greenville	87	29	53.2	1.85	
Groveland	.....	.....	.....	0.66	
Hanford	98	32	61.6	0.00	
Healdsburg	99	39	62.1	0.28	
Heber	106	51	75.6	0.14	
Hollister	86	37	57.9	0.13	
Idyllwild	75	25	50.6	1.48	
Indio	102	57	77.4	0.05	
Iowa Hill	85	34	57.6	1.88	
Isabella	.....	.....	.....	0.00	
Jamestown	89	37	60.7	0.50	
Jolin	.....	.....	.....	0.17	
Kennedy Gold Mine	.....	.....	.....	0.33	
Kentfield	.....	.....	.....	0.30	
Keruville	.....	.....	.....	0.00	
King City	92	41	60.0	0.00	
Laporte	75	28	48.0	2.32	1.5
Laytonville	.....	.....	.....	1.63	
Legrande	98	39	65.3	T.	
Lemoncove	96	42	67.4	0.01	
Lick Observatory	72	35	51.4	0.42	
Livermore	92	39	60.4	0.16	
Lodi	92	42	63.0	0.00	
Lone Pine	88	34	61.1	T.	
Los Gatos	89	40	59.4	0.13	
Lowe Observatory	.....	.....	.....	0.89	
Magalia	82	33	55.8	1.39	
Marysville	95	51	70.6	0.00	
Merced	93	42	65.0	T.	
Mercury	.....	.....	.....	0.95	
Mills College	.....	.....	.....	0.13	
Milo	.....	.....	.....	0.36	
Milton (near)	92	40	63.4	0.26	
Modesto	94	60	71.8	0.18	
Mohave	90	45	68.4	0.00	
Mokelumne Hill	87	42	60.4	0.55	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
Mono Ranch	78	32	55.2	0.12	
Montague	89	30	55.2	0.33	
Monterio	86	34	61.4	1.34	
Monumental	86	30	53.3	7.25	3.0
Mount St. Helena	.....	.....	.....	1.74	
Napa	89	43	59.6	0.26	
Needles	104	41	73.6	0.00	
Nevada City	88	31	55.4	0.97	
New Castle	95	43	64.4	0.33	
Newman *	96	42	66.9	T.	
Nimshew	88	32	57.6	1.53	
North Bloomfield	86	32	55.8	1.07	
Oakland	82	43	59.9	0.00	
Ojai Valley	86	39	59.4	0.05	
Orland	98	42	66.6	0.13	
Orleans	102	41	65.8	2.29	
Oroville (near)	96	44	65.6	0.34	
Ozena	.....	.....	.....	0.00	
Palermo	98	41	64.4	0.28	
Peachland	92	38	57.5	0.34	
Pilot Creek	.....	.....	.....	3.00	1.0
Pine Crest	82	45	61.1	0.02	
Placerville	86	36	56.8	0.65	
Point Lobos	69	49	58.7	0.01	
Porterville	93	40	63.6	0.09	
Poway	90	36	65.2	0.09	
Quincy	84	29	52.5	1.53	
Redding	91	43	64.9	4.38	
Redlands	89	41	61.8	0.38	
Reedley	94	45	65.4	0.00	
Represa	.....	.....	.....	0.70	
Rialto	86	42	62.1	0.29	
Riverside	93	41	63.6	0.07	
Rocklin	95	40	63.4	0.42	
Sacramento	87	48	63.2	0.08	
Salinas	88	41	61.4	0.28	
Salton	92	62	75.2	0.00	
San Bernardino	93	37	63.0	0.11	
San Jacinto	92	39	63.5	0.00	
San Matoe	80	56	65.1	0.03	
San Miguel	85	45	65.6	0.00	
Santa Barbara	85	42	60.2	T.	
Santa Clara College	88	37	59.5	0.13	
Santa Cruz	82	39	58.4	0.35	
Santa Maria	78	41	59.7	0.00	
Santa Monica	70	42	56.6	0.00	
Santa Rosa	94	36	57.5	0.32	
Shasta	98	40	65.2	1.12	
Sierra Madre	87	43	61.6	0.19	
Sisson	90	30	55.0	0.83	
Sonoma	82[j]	37[j]	57.3[j]	0.14	
Sonora	86	44	62.6	0.41	
Sterling	81	32	54.9	1.35	
Stockton	88	45	63.2	T.	
Storey	92	35	62.0	0.00	
Summerdale	71	28	49.5	0.75	
Summit	65	16	39.0	3.06	19.0
Susanville	89	32	51.6	1.03	
Tamarack	74	11	35.8	4.74	47.0
Tehama	90	48	65.8	0.00	
Tulare	90	42	64.2	T.	
Tustin (near)	.....	.....	.....	T.	
Ukiah	95	37	59.8	1.12	
Upperlake	92	40	61.0	0.47	
Upper Mattole	.....	.....	.....	3.28	
Vacaville	95	40	62.6	0.02	
Visalia	92	35	61.3	0.00	
Wasco	97	34	65.0	0.00	
Westpoint	.....	.....	.....	1.30	
Wheatland	94	43	64.6	0.17	
Willetts	.....	.....	.....	1.04	
Willows	92	43	64.3	0.26	
Woodleaf	.....	.....	.....	3.07	
Woodside	85	41	57.9	0.38	
Yosemite	85	29	55.2	1.26	
Yreka	.....	.....	.....	1.45	
Colorado.					
Akron	.....	.....	.....	3.30	
Alamosa	74	21	44.5	1.38	5.0
Arriba	86	15	49.3	0.87	2.0
Ashcroft	70	5	37.8	3.03	.....
Blaine	90	14	56.0	3.96	
Boulder	83	20	50.8	5.29	15.0
Breckenridge	64	3	36.8	2.53	21.5
Buena Vista	72	15	44.2	2.18	8.0
Burlington	94	21	52.6	1.55	
Calhan	79	11	47.0	2.05	3.0
Canyon	85	29	54.7	1.52	
Cascade	.....	.....	.....	3.45	14.5
Castlerock	75	7	41.0	3.12	T.
Cheesman	75	15	46.2	1.88	T.
Cheyenne Wells	92	20	54.2	1.82	6.0
Chromo	77	18	44.2	2.54	6.0
Clearview	69	9	37.6	3.84	25.5
Collbran	81	21	50.2	2.78	
Colorado Springs	80	17	48.2	1.65	4.2
Cope	90	15	52.4	2.43	6.3
Corona	52	5	27.0	7.03	65.8

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Colorado—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cripplecreek	.....	.....	.....	1.17	9.2
Delta	87	25	54.6	1.03	
Eads	90	21	54.8	0.87	
Eagle	77	19	46.0	2.11	1.0
Eureka	.....	.....	.....	2.40	21.0
Fort Collins	83	19	49.0	2.44	2.0
Fort Morgan	90	23	52.3	1.35	1.0
Fowler	.....	.....	.....	2.33	
Frances	74	10	41.2	3.72	31.5
Fruita	84	26	54.0	T.	T.
Garnett	78	20	45.4	1.57	3.0
Gladstone	.....	.....	.....	3.09	39.5
Glenwood	83	19	49.0	1.64	
Gothic	64	1	36.0	4.32	57.8
Grand Valley	87	24	53.1	2.72	
Greeley	88	18	52.9	.....	.....
Grover	.....	.....	.....	1.16	
Hamps	89	19	48.2	1.85	1.0
Hoehne	86	12	48.4	2.72	0.5
Holly	95	25	59.0	1.19	
Holyoke (near)	89	8	51.9	3.55	2.0
Idaho Springs	75	8	43.0	2.45	16.0
Lake City	69	18	42.4	1.48	4.0
Lake Moraine	62	11	35.5	2.62	20.0
Lamar	93	26	57.6	0.76	T.
Laporte	.....	.....	.....	2.68	
Las Animas	95	24	57.7	1.70	
Lay	80	16	44.8	1.73	7.0
Leroy	87	13	49.6	2.85	4.0
Limon	.....	.....	.....	1.93	1.2
Longs Peak	68	3	36.4	5.39	52.0
Lujane	79	25	50.4	1.64	2.0
Manassa	74	20	45.0	.....	.....
Mancos	78	21	47.8	1.33	T.
Meeker	80	17	46.7	2.55	T.
Montrose	84	24	51.5	0.95	
Moraine	78	3	40.9	1.53	25.7
Pagoda	76[c]	18[c]	43.6[c]	.....	7.0
Pagosa Springs	75	20	40.6	3.03	2.0
Paonia	84	28	52.9	2.64	
Platte Canyon	.....	.....	.....	2.90	6.0
Power House	75	24	46.6	1.98	T.
Rangely	81	21	49.9	1.36	
River Portal	79	27	49.4	2.63	T.
Rockyford	90	27	55.3	1.85	
Saguache	78	23	46.1	1.97	11.5
Salida	76	22	47.9	2.81	6.8
San Luis	74	17	44.8	0.96	0.5
Santa Clara	76	14	44.8	6.34	12.0
Sapinero	70	15	42.0	2.30	5.1
Sheridan Lake	93	19	55.7	0.90	
Silt	80	20	50.0	3.26	3.0
Silverton	69	12	38.2	2.47	T.
Stonewall	.....	.....	.....	2.35	6.0
Terminal Dam	.....	.....	.....	2.04	5.0
Trinidad	80	23	52.0	4.25	10.0
Victor	67	16	40.2	2.58	16.3
Vilas	.....	.....	.....	2.76	
Wagon Wheel Gap	70	−3	39.3	1.80	15.0
Waterdale	84	22	49.9	2.60	T.
Westcliffe	75	7	41.2	3.22	4.0
Whitepine	62	2	34.8	1.20	12.0
Wray	91	10	53.2	2.67	3.0
Yuma	.....	.....	.....	1.43	T.
Connecticut.					
Bridgeport	85	31	53.6	3.70	
Canton	86	28	57.4	3.91	
Colchester	87	27	51.9	3.61	T.
Hartford	.....	.....	.....	3.33	
Hawleyville	87	27	52.6	5.95	
North Grosvenor Dale	88	30	51.4	2.95	T.
Norwalk	85	27	53.2	4.46	
Southington	87	28	52.8	3.15	
South Manchester	.....	.....	.....	2.30	
Storrs	85	27	50.7	3.11	
Voluntown	87[c]	29[c]	52.4[c]	4.89	
Wallingford	.....	.....	.....	4.35	
Waterbury	91	27	53.9	3.87	T.
West Cornwall	85	23	49.1	4.42	1.0
West Simsbury	.....	.....	.....	3.99	T.
Delaware.					
Delaware City	.....	.....	.....	5.67	
Dover	84	34	58.7	8.04	
Milford	87	37	59.9	7.89	
Millsboro	86	35	56.6	4.80	
Newark	82	32	57.4	4.98	
Seaford	84	36	58.0	6.97	
District of Columbia.					
West Washington	85	37	58.6	5.27	
Florida.					
Apalachicola	86	56	74.2	8.62	
Avon Park	96	57	78.5	7.72	
Bartow	98[c]	59[c]	79.6[c]	6.96	
Bonifay	88	53	73.4	5.87	
Brooksville	97	57	77.4	4.16	
Carrabelle	87	52	73.6	5.30	
Clermont	97	60	79.8	5.57	
De Funiak	89	55	73.4	3.31	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Florida*—Cont'd.**					
Deland	93	59	78.8		
Eustis	96	56	77.6	4.16	
Federal Point	92	57	75.6	5.03	
Fenholloway	95	50	74.8	6.31	
Fernandina	90	56	74.4	3.13	
Flamingo	87	67	78.8	1.34	
Fort Meade	95	54	77.6	15.58	
Fort Myers	93	59	78.2	6.46	
Fort Pierce	92	59	77.0	4.77	
Gainesville	94	55	76.8	3.91	
Grasmere	96	59	78.8		
Huntington	94	58	76.8	7.15	
Hypoluxo	90	65	78.6	3.58	
Johnstown	92	50	73.8	0.99	
Kissimmee	94	50	77.4	3.89	
Lake City	92	52	75.2	3.65	
Macclenny	91	49	74.0	7.47	
Madison	93	53	75.2	2.07	
Malabar	94	61	77.3	4.91	
Manatee	94	60	77.1	2.54	
Marianna	90	50	73.2	3.17	
Merritts Island	90	64	77.2	3.75	
Miami	91	66	79.8	3.41	
Molino[a]	92	42	70.8		
Monticello	90	50[c]	73.5[b]	5.88	
Mount Pleasant	95	50	74.2	5.08	
New Smyrna	91	58	74.4	3.69	
Ocala	96	57	77.2	6.75	
Orange City	99	54	77.8	5.00	
Orlando	97	56	79.0	2.75	
Panasoffkee	95	55	76.2	4.90	
Plant City	95	53	76.6	8.72	
Rockwell	94[d]	53[d]	77.0[d]	4.03	
St. Andrew	91	52	74.3	5.42	
St. Augustine	91	57	74.9	4.07	
St. Leo	96	57	77.5	5.32	
Switzerland	91[c]	52[c]	74.7[c]	3.60	
Tallahassee	88	53	74.0	3.85	
Tarpon Springs	93	54	76.3	2.38	
Titusville	93	58	75.8	7.90	
Wausau	92	49	74.4	5.00	
Georgia.					
Abbeville	.....	.....	.....	2.69	
Adairsville	85	45	66.6	5.88	
Albany	94	51	75.1	3.15	
Allapaha	93	51	73.2	3.41	
Americus	92	50	72.6	3.38	
Athens	85	49	68.4	2.87	
Bainbridge	93	45	74.0	2.88	
Blakely	93	50	74.2	2.68	
Bowersville	89	46	68.7		
Brunswick	91	54	73.2	3.66	
Butler	.....	.....	.....	3.74	
Camak	87	47	68.6	4.17	
Canton	.....	.....	.....	4.91	
Carlton	.....	.....	.....	2.47	
Carrollton	83	44	66.0	3.95	
Clayton	84	41	63.4	4.51	
Columbus	89	50	71.8	4.12	
Cordele	83	53	70.4	3.24	
Covington	89[g]	45[g]	67.7[g]	4.02	
Cuthbert	90	49	72.8	2.79	
Dawson	96	51	74.6	2.50	T.
Diamond	82	38	62.2	6.78	
Dublin	.....	.....	.....	4.12	
Dudley	91	51	72.2	4.07	
Eastman	95	52	74.8	3.03	
Eatonton	90	46	70.0	2.76	
Elberton	89	47	69.6	2.63	
Experiment	86	46	68.6	2.27	
Fitzgerald	94	52	73.8	3.48	
Fleming	93	48	72.6	4.12	
Forsyth[d]	92	41	73.0		
Fort Gaines	90	51	72.7	3.10	
Gainesville	86	46	66.1	4.02	
Gillsville	84	44	67.2	5.77	
Glenville	93	53	73.4	3.68	
Greenbush	83	44	65.1	7.63	
Greensboro	90	50	70.1	2.74	
Griffin	88	45	69.5	2.15	
Harrison	90	48	70.4	3.88	
Helena	90	52	73.0	3.25	
Lisbon	93	47	71.0	4.44	
Lost Mountain	88	42	67.2	5.36	
Louisville	89	51	70.9	4.33	
Lumpkin	87	45	69.2	3.97	
Marshallville	91	49	71.9	5.05	
Mauzy	95	50	74.8	4.69	
Milledgeville	93	46	70.9	4.23	
Millen	93	47	72.1	5.07	
Montezuma	.....	.....	.....	3.58	
Monticello	90	47	70.4	2.55	
Morgan	88	52	72.2	3.11	
Newnan	93	45	68.0	5.26	
Oakdale	.....	.....	.....	5.25	
Point Peter	89	42	68.3	2.86	
Putnam	92	48	72.1	2.57	
Quitman	93	53	74.1	5.04	
***Georgia*—Cont'd.**					
Ramsey	86	42	67.7	6.63	
Resaca	.....	.....	.....	1.93	
Rome	92	41	67.9	7.00	
St. George	90	55	73.8	4.68	
St. Marys	94	52	74.2	4.82	
Screven	91	50	73.2	6.60	
Statesboro	92	50	72.5	4.53	
Talbotton	89	45	70.1	5.08	
Tallapoosa	86	42	67.8	4.29	
Toccoa	83	43	64.9	4.32	
Valdosta	95	48	74.4	3.03	
Valona	90	50	71.6	5.83	
Washington	85	50	68.5	3.35	
Waycross	95	50	74.6	4.23	
Waynesboro	87	49	70.4	8.63	
Westpoint	87	47	68.7	4.63	
Woodbury	88	43	68.2	4.81	
Idaho.					
Albion	80	22	53.6	0.68	
American Falls	81	28	52.6	0.59	
Blackfoot	80	26	51.8	0.92	
Bonners Ferry	84	28	55.0	1.67	
Buhl	84[c]	31	57.0[c]	0.47	
Burke	74	24	44.6	1.44	T.
Caldwell	90	32	58.8	0.26	
Cambridge	.....	.....	.....	0.21	
Chesterfield	79	25	50.5	0.85	T.
Dent	93	29	56.7	0.80	
Dewey	74	25	47.1	0.32	0.9
Driggs	72	21	45.2	2.40	1.0
Ellerslie	83	29	55.6	0.04	
Emmett	89	29	58.5	0.08	
Forney	82	16	46.6	0.69	
Garnet	94	39	64.4	T.	
Grace	83[d]	23[d]	50.8[d]	2.94	
Hailey	80	29	51.6	.....	
Hot Springs	85	29	58.2	0.06	
Idaho Falls	82	27	52.0	1.51	
Lake	70	20	43.8	1.52	0.2
Lakeview	80	29	53.8	2.00	
Landore	75	26	45.3	1.99	2.5
Lardo	77	23	46.6	1.28	1.1
Lost River	74	22	49.2	0.76	T.
Meadows	93	25	50.8	0.85	
Milner	81[d]	27[d]	54.8[d]	0.70	
Moscow	87	36	56.2	0.81	
Mountain Home	85	27	56.8	T.	
Murray	85	24	52.0	1.02	
Murtaugh	82[b]	21[e]	51.6[e]	0.73	
Nevens Ranch	.....	.....	.....	T.	
Oakley	80	30	53.0	0.81	
Orofino	95	32	58.8	1.37	
Payette	89	31	59.0	0.18	
Pollock	93	34	57.8	1.64	
Poplars	.....	.....	.....	0.19	
Porthill	83	30	54.1	2.83	
Rupert	84	28	54.1	0.77	
St. Maries	84	30	55.0	0.84	
Salem	.....	.....	.....	0.87	
Salmon	82	24	51.8	0.52	
Standrod	.....	.....	.....	1.88	2.2
Twin Falls	82	27	54.2	0.93	
Vernon	88[f]	25[f]	51.8[f]	1.05	.....
Weston	79	25	50.0	2.33	1.0
Illinois.					
Albion	89	33	61.0	4.12	
Aledo	85	27	55.3	5.13	T.
Alexander	86	29	57.4	2.38	
Antioch	86	23	51.0	5.29	T.
Ashton	82	24	52.3	5.10	0.5
Astoria	84	28	55.4	2.75	T
Aurora	84	27	52.4	4.90	1.3
Beardstown	.....	.....	.....	2.92	
Benton	88	34	62.2	5.30	
Bloomington	86	26	56.6	2.85	T.
Bushnell	86	28	56.7	2.62	
Cambridge	85	27	54.8	4.15	T.
Carlinville	86	29	58.4	4.36	
Carlyle	.....	.....	.....	3.81	
Carrollton	88	22	57.7	3.70	
Charleston	85	30	57.7	2.79	
Chester	91	36	62.6	5.48	
Cisne	89	33	61.3	5.40	
Coatsburg	87	26	57.0	2.14	T.
Cobden	87	36	60.9	5.44	
Colchester	85	28	56.8	2.33	T.
Dwight	85	26	55.3	3.13	0.5
Equality	89	34	62.2	6.47	
Flora	87	33	59.2	4.02	
Friendgrove	85	36	59.9	4.69	
Grafton	.....	.....	.....	2.62	
Greenville	82	30	58.0	4.03	
Griggsville	88	30	58.8	3.35	
Halfway	87	36	61.0	4.58	
Havana	89	30	59.7	2.54	
Henry	83	28	56.8	3.65	T.
Hoopeston	82	28	55.2	3.28	
Joliet	85	28	53.4	3.32	4.5
***Illinois*—Cont'd.**					
Kishwaukee	85	26	52.6	2.90	0.5
Knoxville	86	30	57.5	2.29	
Lagrange	86	27	51.7	2.61	1.0
Laharpe	84	27	56.4	2.75	T.
Lanark	84	22	51.9	3.23	1.0
Lincoln	84	32	57.6	5.54	T.
Loami	.....	.....	.....	2.65	
Martinsville	91[e]	31[e]	59.0[e]	5.08	
Mascoutah	88	32	60.8	8.19	
Minonk	84	26	55.7	4.14	0.8
Monmouth	87	27	57.0	2.79	T.
Morrison	83	27	53.9	6.03	
Morrisonville	84	29	56.8	3.28	
Mount Carmel	.....	.....	.....	3.80	
Mount Vernon	92	34	61.2	4.39	
New Burnside	87	33	60.6	4.85	
Ottawa	85	30	56.0	4.84	
Palestine	86	34	59.7	4.15	
Pana	85	29	57.0	3.78	
Paris	84[h]	31[g]	58.4[h]	2.53	
Peoria	.....	.....	.....	2.08	
Philo	88	30	55.8	3.43	
Pontiac	83	29	56.8	3.28	0.5
Raum	86	35	61.8	7.07	
Riley	83	26	51.2	4.29	0.7
Robinson	84	35	58.9	6.71	
Rushville	84	30	57.6	3.66	
St. Charles	85	27	52.4	4.15	T.
St. John	89	35	62.0	5.08	
Streator	85	29	55.0	3.70	T.
Sullivan	88	29	57.6	2.94	
Tilden	88	34	59.8	5.40	
Tiskilwa	85	27	54.9	5.65	1.0
Urbana	84	30	54.4	5.04	
Vernon	86	31	59.9	3.82	
Walnut	86	29	55.7	4.13	T.
Warsaw	.....	.....	.....	5.27	
Windsor	86	30	57.6	3.82	
Winnebago	84	25	51.8	3.20	2.0
Yorkville	85	26	53.0	4.60	2.0
Zion	82	24	51.6	3.45	0.2
Indiana.					
Anderson	83	32	56.2	2.85	
Angola	82	27	52.4	4.13	0.5
Auburn	82	26	51.1	4.95	.....
Bedford	85	33	58.0	4.58	
Bloomington	85	36	58.9	3.98	
Bluffton	81	29	54.6	2.80	
Butlerville	85	32	58.1	2.54	
Cambridge City	83	29	54.0	2.27	
Columbus	87	31	57.6	2.62	
Connersville	85	30	57.0	2.70	
Crawfordsville	88	30	57.0	.....	
Delphi	84	28	54.8	2.87	
Elkhart	83	30	55.0	5.57	T.
Eminence	84	33	57.4	3.78	
Farmersburg	85	34	58.0	7.54	
Farmland	84	30	54.4	3.68	
Fort Wayne	84	29	54.0	3.31	T
Franklin	87	30	57.8	4.26	
Greenfield	85	34	57.5	3.16	
Greensburg	89	33	58.2	2.82	
Hammond	84	28	53.0	3.70	2.0
Holland	87	36	62.4	3.78	
Huntington	80	30	54.6	2.67	T.
Jeffersonville	91	36	62.4	4.60	
Knox	82	28	54.6	3.02	T.
Kokomo	82	29	54.5	3.15	
Lafayette	82	31	55.1	3.91	
Laporte	82	27	51.5	4.72	T.
Lima	81	27	51.6	4.55	0.5
Logansport	85	30	55.8	4.07	
Madison	91	35	61.8	2.95	
Marengo	86	33	60.1	4.10	
Marion	84	28	55.2	2.35	T.
Markle	82	27	54.6	3.30	T.
Mauzy	85	30	56.2	2.36	
Moores Hill	84	33	58.2	2.84	
Mount Vernon	86	32	61.8	5.02	
Northfield	84	27	53.9	3.78	
Paoli	85	36	59.8	2.88	
Princeton	87	35	60.4	4.46	
Rensselaer	83	28	55.8	4.40	
Richmond	84	30	56.0	2.79	
Rochester	80	30	55.0	4.20	
Rockville	84	32	56.8	4.16	
Rome	90	35	63.0	5.04	
Salamonia	84	29	54.4	2.58	
Salem	86	30	58.8	3.72	
Scottsburg	88	35	61.0	3.11	
Shelbyville	88	33	57.4	5.51	
South Bend	80	26	51.9	4.13	1.0
Syracuse	81	28	54.0	4.62	T.
Terre Haute	85	34	59.3	3.40	
Veedersburg	85	30	57.2	5.18	
Vevay	86	35	59.5	2.30	T.
Vincennes	89	34	60.2	3.24	
Washington	86	35	59.1	2.53	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Indiana—Cont'd.					
Worthington	83	34	59.3	4.48	
Indian Territory.					
Ada	89	34	62.8	4.06	
Ardmore	92	36	62.6	5.61	
Calvin				5.06	
Durant	90	37	62.4	5.38	
Fairland	87	35	62.1	6.61	
Fort Gibson				3.98	
Hartshorn	87	36	64.8	8.38	
Healdton	90	33	62.0	9.09	
Holdenville	89	34	61.2	5.06	
Idabel	89	40	66.7	11.39	
Marlow	92	34	61.2	7.30	
Muskogee	85	37	62.6	4.79	
Okmulgee	86	35	62.2	3.88	
Pauls Valley	92	32	62.4	7.70	
Ravia	91	32	63.6	6.31	
South McAlester	89	37	65.3	3.66	
Tulsa	88	35	61.2	5.25	
Vinita	84	34	61.2	5.89	
Wagoner	88	35	63.0	4.05	
Webbers Falls	89	35	63.8	3.73	
Iowa.					
Afton	89	23	56.4	2.26	1.8
Albia	84	21	53.9	6.58	1.0
Algona	87	21	50.4	1.97	1.0
Allerton	85	19	55.6	3.28	2.3
Alta	88	24	50.6	3.39	0.5
Alton	90	24	51.7	5.95	1.5
Amana	83	24	54.7	3.70	1.0
Ames	85	18	53.4	3.54	0.1
Atlantic	87	18	54.0	2.19	1.5
Audubon	92	20	54.0	2.89	0.2
Baxter	86	21	53.7	5.37	0.5
Bedford	86	19	54.9	3.68	.....
Belleplaine	.....	.....	.....	3.90	0.2
Bloomfield	84	22	57.0	6.37	4.0
Bonaparte	83	25	55.8	6.20	2.5
Boone	85	21	51.8	3.13	T
Britt	87	19	50.2	1.8[illegible]	0.7
Buckingham	.....	.....	.....	2.45	T
Burlington	84	26	55.8	2.74	
Carroll	88	18	52.2	2.85	
Cedar Rapids	84	27	53.0	3.12	
Chariton	87	19	54.9	4.32	1.0
Clarinda	92	21	55.4	3.25	T.
Clearlake	82	22	51.4	0.71	
Clinton	86	26	55.0	4.45	
Columbus Junction	85	27	56.0	6.68	0.2
Corning	87	23	54.3	2.74	1.5
Corydon	85	21	55.8	3.37	3.0
Creston	86	23	52.8	2.62	0.4
Cumberland	.....	.....	.....	2.46	T.
Decorah	86	22	52.6	1.82	
Delaware	81	22	52.0	4.59	0.7
Denison	86	17[e]	52.0[h]	3.50	2.3
Desoto	85	21	54.5	3.47	T
Dows	88	17	50.8	3.20	T.
Earlham	83	19	53.0	3.23	1.0
Elkader	85	21	52.8	2.04	0.5
Elliott	96	25	57.0	3.20	1.6
Estherville	89	21	48.9	3.82	.....
Fayette	84	18	51.0	2.34	0.6
Forest City	88	22	49.2	1.04	1.8
Fort Dodge	88	21	51.4	3.92	T.
Fort Madison	.....	.....	.....	3.60	
Galva	88	18	52.2	3.54	
Gilman	.....	.....	.....	3.08	
Grand Meadow	82	22	52.0	2.18	0.8
Greene	86	21	52.1	2.99	1.0
Greenfield[b]	84	26	55.3		
Grinnell	84	22	54.8	5.49	1.5
Grundy Center	84	20	52.4	3.95	T.
Hampton	86	22	52.0	3.99	T.
Hancock	85	25	55.0	3.35	1.0
Harlan	87	19	53.6	2.87	0.1
Humbolt	88	20	52.8	3.49	
Independence	84	21	52.2	4.33	T.
Indianola	83	25	55.0	4.98	T.
Inwood	93	22	50.9	2.21	2.5
Iowa City	83	55	53.5	5.47	
Iowa Falls	86	18	51.2	4.37	.....
Jefferson	86	19	54.2	3.26	T.
Keosauqua	85	24	55.8	5.43	1.0
Knoxville	86	25	56.1	4.74	2.2
Lacona	.....	.....	.....	4.68	2.0
Larrabee	88	21	52.6	2.89	1.0
Leclaire	.....	.....	.....	5.04	
Lemars	92	17	52.4	4.42	T.
Lenox	88	25	55.8	2.35	1.0
Leon	85	26	56.1	2.86	3.0
Little Sioux	89	27	55.6	1.35	
Logan	87	21	54.8	1.77	T.
Maple Valley	.....	.....	.....	3.77	
Marshalltown	86	20	53.1	3.02	T.
Mason City	90	24	51.4	1.31	.....
Massena	86	20	53.8	2.11	1.5
Mountayr	89	24	55.8	7.13	1.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Iowa—Cont'd.					
Mount Pleasant	85	25	56.6	5.76	T.
Mount Vernon	85	24	54.4	4.32	1.4
Murray	88	25	55.8	2.20	.....
Muscatine	.....	.....	.....	4.04	
Nevada	.....	.....	.....	3.11	0.5
New Hampton	83	23	50.4	2.09	1.0
Newton	85	23	54.4	6.53	T.
Northwood	85	20	50.2	1.31	0.4
Odebolt	90	22	54.4	4.87	.....
Ogden	89	21	54.1	4.05	T.
Olin	80	25	53.4	2.89	1.2
Onawa	91	26	57.1	1.46	T.
Oskaloosa	85	24	55.8	4.43	.....
Ottumwa	86	25	56.2	5.63	0.7
Pacific Junction	91	25	56.0	1.88	1.8
Pella	85	26	57.0	5.49	.....
Perry	89	20	54.5	5.25	0.5
Plover	92	20	51.0	3.65	.....
Pocahontas	90	22	52.3	2.79	2.6
Ridgeway	86	22	51.2	1.90	1.0
Rock Rapids	92	22	50.4	2.60	5.5
Rockwell	90	17	53.2	4.83	2.0
Sac City	88	20	52.4	5.18	.....
St. Charles	83	25	54.2	3.87	0.5
Sheldon	91	22	51.6	3.22	2.0
Sibley	89	22	48.0	1.75	2.0
Sigourney	86	24	56.1	2.88	4.3
Sioux Center	89	21	50.9	3.45	T.
Stockport	82	25	55.6	4.83	2.0
Stuart	84	27	55.4	3.56	.....
Thurman	93	24	57.1	1.43	1.0
Tipton	80	29	55.1	7.68	
Toledo	83	22	53.8	3.81	.....
Wapello	81	29	55.3	5.39	
Washington	84	24	55.1	4.47	.....
Washta	89	18	51.6	4.44	T.
Waterloo	85	22	52.0	3.66	T.
Waukee	86	24	55.8	3.06	1.0
Waverly	85	21	53.0	3.23	1.0
Webster City	86	17	53.8	4.58	T.
Westbend	87	20	50.6	2.39	T.
Whitten	85	14	53.7	4.40	T.
Wilton Junction	82	23	54.5	5.49	.....
Winterset	86	25	55.9	3.28	1.0
Woodburn	90	19	55.4	3.78	2.0
Zearing	89	18	52.2	.....	
Kansas.					
Abilene	.....	.....	.....	1.48	
Alton	96	25	57.6	1.43	T.
Anthony	97	28	59.5	4.08	
Ashland	94	25	59.9	1.32	T.
Atchison	90	25	59.0	1.71	3.0
Baker	92	25	56.5	1.37	0.5
Beloit	.....	.....	.....	0.71	
Blue Rapids	.....	.....	.....	1.24	
Burlington	88	24	60.1	3.12	
Chapman	94	21	59.8	1.69	1.0
Cimarron	90	25	56.2	2.30	T.
Clay Center	95	23	59.0	1.07	T.
Colby	94	22	55.6	1.13	1.0
Coldwater	89	26	59.2	1.38	T.
Columbus	86	29	60.0	8.03	
Coolidge	95	25	57.8	1.34	T.
Cottonwood Falls	90	22	59.2	2.68	0.3
Cunningham	94	25	58.8	2.30	T.
Dresden	96	24	55.8	1.13	3.0
Eldorado	87	25	59.4	3.98	T.
Ellinwood	92	25	58.0	1.48	T.
Ellsworth	93	24	58.1	1.44	1.2
Emporia	89	25	59.4	3.49	1.0
Enterprise	96	23	60.0	1.29	1.0
Eskridge	88	27	58.3	2.14	2.0
Eureka	.....	.....	.....	3.96	
Fall River	90	26	59.8	3.43	
Farnsworth	93	20	57.2	1.47	2.0
Forest Hill	94	22	57.7	0.95	2.5
Fort Scott	86	25	57.6	5.39	
Frankfort	93	23	57.6	1.38	3.0
Garden City	92	27	59.1	2.44	
Garnett	88	25	61.1	3.84	T.
Goodland	94	22	54.2	1.72	3.0
Greensburg	90	26	58.6	2.43	T.
Grenola	87	27	58.7	3.43	
Hanover	95	25	59.2	1.78	4.2
Harrison	95	25	57.0	1.13	4.0
Hays	94	17	56.2	0.83	1.0
Hill City	95	26	57.4	0.20	1.5
Horton	92	26	58.0	1.34	2.0
Howard	88	27	59.5	2.45	
Hugoton	90	26	57.7	3.34	T.
Hutchinson	92	24	58.2	2.82	0.5
Independence	90	29	61.4	4.11	
Jetmore	95	25	58.6	1.66	
Jewell	99	20	58.6	1.00	2.0
La Crosse	97	22	57.6	1.65	T.
Lakin	95	26	58.6	1.61	
Larned	91	22	56.8	1.79	T.
Lebanon	95	24	56.8	0.90	1.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Kansas—Cont'd.					
Lebo	89	27	59.0	4.00	T.
Liberal	90	28	59.2	2.70	T.
Macksville	90	23	56.2	1.94	T.
McPherson	92	24	57.8	1.92	T.
Madison	90	24	59.2	4.03	
Manhattan	95	26	58.3	1.24	1.6
Manhattan Agr. College	92	23	59.2	1.05	1.5
Minneapolis	91	24	58.0	1.00	1.5
Moran	85	26	59.4	4.68	
Mounthope	.....	.....	.....	3.83	
Neosho Rapids	.....	.....	.....	4.19	
Ness City	.....	.....	.....	2.53	
Norton	96	24	56.6	1.95	4.5
Norwich	92	26	60.2	2.87	T.
Oberlin	.....	.....	.....	1.49	4.0
Olathe	86	22	57.8	5.89	4.0
Osage City	90	29	58.4	3.33	
Oswego	85	29	59.8	4.77	
Ottawa	90	21	58.0	3.38	T.
Paola	88	24	58.2	4.18	
Phillipsburg	97	26	57.9	1.11	2.0
Plainville	94	25	56.8	0.88	1.5
Pleasanton	83	26	58.5	5.36	
Republic	96	25	57.8	2.35	3.0
Rome	89	26	59.2	3.61	
Russell	95	24	57.0	1.55	0.5
Salina	94	24	59.5	1.13	1.0
Scott	92	24	57.2	2.60	3.0
Sedan	89	29	59.4	2.33	
Toronto	88	23	58.6	3.79	
Ulysses	91[h]	27[h]	58.3[h]	2.54	0.5
Valley Falls	92	23	58.5	1.45	4.0
Wakeeney	93	24	57.3	0.84	1.0
Wakeeney (near)	.....	.....	.....	0.53	2.0
Wallace	96	21	55.5	0.85	1.5
Walnut	84	27	59.6	4.80	
Winfield	90	26	60.2	4.90	
Yates Center	91	26	60.2	3.53	
Kentucky.					
Alpha	81	40	60.6	5.85	
Anchorage	88	35	60.8	5.06	
Bardstown	91	38	62.5	4.03	
Beattyville	89	34	60.8	5.87	
Beaver Dam	90	33	61.8	6.80	
Berea	87	33	61.4	5.10	
Blandville	84	39	61.1	8.98	
Bowling Green	92	35	64.6	5.76	
Burnside	90	36	61.4	6.22	
Cadiz	88	34	62.9	8.18	
Calhoun	91	35	63.7	6.41	
Catlettsburg	90	35	63.0	5.50	
Earlington	89	33	61.4	7.73	
Edmonton	87	34	60.6	6.24	
Eubanks	87	32	60.6	4.09	
Falmouth	.....	.....	.....	4.02	
Farmers	88	32	61.0	5.13	
Frankfort	83	38	61.0	3.07	
Franklin	88	37	62.9	5.55	
Greensburg	89	30	60.0	5.41	
High Bridge	.....	.....	.....	4.11	
Hopkinsville	89	33	60.6	6.82	
Irvington	86	38	62.2	7.69	
Leitchfield	85	36	60.8	6.90	
Loretto	87	33	62.6	6.22	
Lynnville	87[f]	39[f]	61.8[f]	9.58	
Manchester	88	36	61.9	4.85	
Marion	86	38	62.0	6.48	
Maysville	90	33	60.1	4.00	
Middlesboro	89	33	62.8	2.92	
Mount Sterling	85	35	60.8	4.88	
Owensboro	87	37	60.4	6.13	
Owenton	83	37	60.0	4.10	
Paducah	93	40	64.6	6.99	
Richmond	88	36	62.4	3.87	
St. John	86	35	58.8	4.78	
Scott	86	35	58.8	3.55	
Shelby City	87	31	60.2	5.73	
Shelbyville	86	35	58.8	2.36	
Taylorsville	88	35	61.8	3.34	
West Liberty	90[e]	35[e]	61.0[e]	2.77	
Williamsburg	90	34	61.5	3.40	
Williamstown	86	30	58.4	2.38	
Louisiana.					
Abbeville	90	51	72.8	16.03	
Alexandria	93	45	71.6	17.61	
Amite	88	48	71.0	17.06	
Baton Rouge	92	51	70.6	23.73	
Burnside	87	51	72.3	20.88	
Calhoun	91	44	67.9	8.39	
Cameron	84	55	73.0	13.27	
Cheneyville	85	50	68.6	20.98	
Clinton	86	49	69.8	18.04	
Collinston	91	47	69.0	6.41	
Covington	91	51	72.0	15.08	
Donaldsonville	90	56	72.2	16.80	
Farmerville	89	47	68.2	7.30	
Ferriday	87	48	69.6	15.06	
Franklin	91	52	73.2	15.29	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	*Ins.*	*Ins.*
***Louisiana*—Cont'd.**					
Grand Cane	90	45	67.8	7.15	
Grand Coteau	90	50	71.8	25.67	
Houma	90	52	73.8	13.45	
Jennings	87	50	71.0	21.73	
Lafayette	88	49	71.0	22.74	
Lakeside	88	51	72.2	20.07	
Lawrence	89	57	73.4	10.05	
Libertyhill	88	44	68.2	9.02	
Logansport	......	......	......	6.96	
Melville	87	52	70.6	19.90	
Monroe	88	50	69.6	7.83	
New Iberia	86	54	72.6	17.22	
Opelousas	92	50	72.2	29.70	
Plain Dealing	90	42	67.6	6.26	
Rayne	88	50	72.1	23.17	
Reserve	95	55	74.0	13.69	
Robeline	91	43	68.6	10.15	
Ruston	88	40	68.0	......	
Schriever	90	51	73.5	15.05	
Southern University	......	......	......	15.18	
Sugar Experiment Station	88	57	73.3	14.56	
Sugartown	87	49	70.4	21.50	
Maine.					
Bar Harbor	75	29	47.2	2.90	2.0
Cornish	81	26	48.5	2.05	T.
Danforth	......	......	......	1.76	......
Debsconeag	75	25	48.7	1.30	2.0
Fairfield	75	29	49.2	2.62	0.5
Farmington	81	27	49.0	2.57	2.0
Gardiner	70	29	48.8	2.48	......
Greenville	73[f]	17[b]	44.6[e]	2.54	......
Houlton	74	21	47.2	1.60	
Lewiston	80	31	49.4	2.11	
Madison	81	28	49.0	2.83	......
Mayfield	72	25	45.8	2.40	1.0
Millinocket	83	26	49.3	2.50	......
North Bridgton	80	28	49.2	2.21	1.0
Oquassoc	74	26	46.0	1.90	1.0
Orono	75	27	49.0	1.77	......
Patten	68	20	45.6	2.05	......
Rumford Falls	77	30	48.2	1.84	2.0
The Forks	......	......	......	2.42	0.5
Van Buren	72	25	45.2	0.90	
Winslow	75	24	48.2	2.58	......
Maryland.					
Annapolis	80	41	58.0	8.02	
Bachmans Valley	84[d]	29	57.5[b]	4.59	
Cambridge	88	40	61.3	7.74	
Cheltenham	84	36	58.1	4.51	
Chestertown	80	36	58.4	6.72	
Chewsville	85	28	56.2	3.40	
Clearspring	86	32	55.8	4.38	
Coleman	82	35	58.8	4.52	
Collegepark (Md. Ex. Sta.)	85	30	58.8	3.44	
Crisfield	......	......	......	5.78	
Cumberland	......	......	......	4.60	
Darlington	82	33	57.4	3.42	
Deerpark	79	23	52.4	4.59	
Denton	85	34	59.0	8.05	
Easton	79	37	58.6	6.53	
Fallston	80	31	56.4	3.28	
Frederick	87	34	59.4	3.63	
Frostburg	......	......	......	4.42	
Grantsville	81	26	53.5	4.16	
Great Falls	87	30	59.4	1.59	
Harney	......	......	......	2.78	
Jewell	84	39	57.1	5.42	
Keedysville	91	31	59.4	3.31	
Lake Montebello	83	35	56.8	3.06	
Laurel	87	32	59.2	3.63	
Monrovia	86	32	58.2	2.84	
Mount St. Marys College	......	......	......	3.88	
Oakland	83	25	53.2	5.19	
Pocomoke City	85	40	60.7	3.95	
Portobello	85	38	61.5	5.67	
Princess Anne	82	36	58.7	5.59	
Salisbury	87	36	59.9	5.45	
Solomons	83	42	60.5	4.60	
Sudlersville	84	34	58.5	6.32	
Takoma Park	86	35	58.4	4.05	
Taneytown	87	30	56.8	2.63	
Van Bibber	80	34	57.6	3.48	
Westernport	89	29	58.6	4.06	
Woodstock	83	34	60.1	4.34	
Massachusetts.					
Amherst	90	25	51.7	4.02	T.
Bedford	82	30	51.4	3.24	T.
Bluehill (summit)	80	29	49.5	3.39	1.0
Chestnuthill	82	32	53.7	4.06	
Concord	82	28	50.6	3.31	T.
Fallriver	79	31	51.2	4.11	......
Fitchburg	85	28	51.8	2.54	......
Framingham	85	29	51.4	3.53	
Groton	83	27	50.7	3.06	T.
Hyannis	......	......	......	5.13	
Jefferson	......	......	......	3.14	
Lawrence	82	29	52.0	2.10	T.
Leominster	......	......	......	2.64	T.
***Massachusetts*—Cont'd.**					
Lowell	80	31	53.9	2.58	......
Middleboro	83	29	51.2	3.47	
Monson	86	27	51.3	4.11	T.
New Bedford	75	34	51.4	......	
Plymouth	82	30	51.2	3.48	
Princeton	......	......	......	2.81	
Provincetown	72	35	50.0	3.81	
Salem	......	......	......	2.96	T.
Somerset	82	30	54.1	3.88	
Sterling	......	......	......	2.78	
Taunton	82	29	51.0	4.15	
Webster	......	......	......	3.27	
Westboro	87	29	54.0	3.74	T.
Weston	......	......	......	3.55	
Williamstown	83	27	50.8	2.2[illegible]	0.2
Winchendon	......	......	......	3.29	T.
Worcester	87	29	52.4	2.72	T.
Michigan.					
Adrian	83	25	52.2	3.43	1.0
Agricultural College	81	27	51.2	2.22	0.2
Allegan	88[f]	20[g]	46.2[g]	......	1.0
Alma	81	24	50.2	1.79	1.0
Ann Arbor	81	27	49.3	2.82	0.2
Arbela	82	26	50.2	2.46	3.0
Ball Mountain	80	25	49.0	2.81	2.6
Baraga	62	22	39.0	......	3.0
Battlecreek	85	31	54.4	2.66	T.
Bay City	83	26	49.0	1.35	1.0
Berlin	80	25	48.8	2.67	4.3
Big Rapids	79	23	49.0	2.10	3.0
Blaney	68	17	41.2	3.37	1.0
Bloomingdale	84	24	52.4	2.27	T.
Calumet	65	21	38.8	4.08	2.5
Cassopolis	81	28	52.4	4.50	1.0
Charlevoix	75	22	43.8	0.70	7.0
Charlotte	85	25	50.5	1.86	
Chatham	67	16	38.8	1.73	2.6
Cheboygan	65	22	43.2	2.18	4.0
Clinton	78	24	51.2	2.88	T.
Coldwater	82	25	52.6	3.10	1.5
Concord	82	25	51.4	3.32	2.5
Deer Park	63	18	39.6	3.50	3.5
Detour	57	25	40.4	3.69	7.0
Durand	83	26	52.6	2.94	1.3
Eagle Harbor	56	22	38.6	3.92	5.5
East Tawas	82	20	44.8	1.75	
Eloise	84	26	46.7	1.71	T.
Flint	82	27	49.6	2.21	2.0
Frankfort	63	26	44.8	3.56	
Gaylord	......	......	......	1.83	6.0
Grand Marais	57	22	38.4	3.85	3.0
Grape	85	27	52.0	3.55	1.0
Grasslake	81	25	51.0	3.06	3.0
Grayling	79	20	47.0	2.27	5.2
Hagar	84	25	49.6	3.96	T.
Harbor Beach	82	26	46.2	2.00	
Harrison	81	20	48.4	1.65	T.
Harrisville	83	19	43.6	2.19	T.
Hayes	83	20	47.0	0.92	2.0
Highland	......	......	......	2.42	3.5
Hillsdale	81	25	50.3	3.31	1.0
Holland	83	21	50.8	2.34	2.0
Howell	82	24	50.6	2.44	2.5
Humboldt	62	13	37.9	2.45	2.0
Iron Mountain	68	20	44.3	2.19	T.
Iron River	70	14	42.5	4.12	2.0
Ironwood	72	16	42.7	0.68	0.5
Isle Royal	47	23	36.4	1.71	4.0
Ivan	80	20	47.2	1.75	4.0
Jackson	84	26	53.4	2.74	T.
Jeddo	82	25	48.4	1.78	3.5
Kalamazoo	72[e]	27[e]	50.0[e]	2.87	1.0
Lansing	82	26	51.8	2.40	2.0
Lapeer	84	26	50.2	2.46	0.5
Ludington	72[d]	26[d]	46.6[d]	3.59	T.
Macinac Island	56	26	38.6	5.00	6.0
Mackinaw	58	27	42.0	......	T.
Mancelona	79	20	45.9	1.05	4.0
Manistee	78[h]	30[j]	49.8[i]	......	......
Maple Ridge	67	17	41.6	2.89	......
Marlboro	79[e]	20[e]	49.4[e]	1.80	T.
Menominee	76	22	44.3	2.18	1.5
Montague	77	26	49.1	1.74	1.0
Morenci	82	26	52.0	3.86	1.2
Mount Clemens	80	25	48.0	3.69	1.5
Mount Pleasant	83[d]	22	47.8[b]	2.25	......
Muskegon	73	29	49.0	1.99	T.
Old Mission	74	25	44.2	2.85	5.0
Olivet	79	26	50.8	2.67	2.0
Omer	82	18	46.4	1.24	T.
Ovid	83	25	50.8	2.11	0.5
Owosso	80[f]	24[f]	50.6[f]	2.03	T.
Petoskey	68	20	44.1	1.18	10.0
Plymouth	83	23	49.9	2.50	
Port Austin	83	30	46.2	......	T.
Powers	65	17	39.5	......	......
Reed City	80[e]	20[e]	47.4[e]	0.57	1.0
Roscommon	76	12	45.8	1.94	3.0
***Michigan*—Cont'd.**					
Saginaw (W. S.)	83	24	50.6	1.76	0.8
St. Ignace	63	27	42.0	3.91	3.0
St. James	......	......	......	0.69	2.0
St. Johns	83	26	51.6	......	......
St. Joseph	82	31	50.4	4.33	
Saranac	85	24	51.6	2.18	1.0
South Haven	82	25	47.2	2.79	T.
Stanton	......	......	......	......	1.0
Thomaston	70	10	41.4	3.95	5.0
Thornville	83	26	51.4	2.76	8.0
Traverse City	77	25	45.4	2.84	2.0
Vassar	82	32	51.0	1.55	T.
Wasepi	81	25	51.6	3.38	T.
Webberville	82	26	51.8	1.95	1.5
West Branch	......	......	......	1.81	T.
Wetmore	68	15	39.2	......	4.0
Whitefish Point	63	24	38.2	4.20	7.2
Woodlawn	79	17	43.1	2.91	5.0
Ypsilanti	81	26	51.2	2.92	1.0
Minnesota.					
Albert Lea	86	23	49.6	1.42	T.
Alexandria	76	18	44.5	2.27	3.0
Angus	74	7	42.8	0.71	
Bagley	73	15	42.8	1.00	6.0
Beardsley	......	......	......	2.15	3.8
Beaulieu	77	16	44.4	1.00	4.0
Bird Island	85	20	48.1	3.01	5.1
Blackduck	73	14	42.0	0.89	0.2
Caledonia	82	22	50.2	2.16	T.
Campbell	72	20	44.8	1.48	1.0
Collegeville	83	20	46.7	2.63	2.5
Crookston	75	14	42.8	0.98	T.
Detroit	77	16	42.5	2.82	1.8
Fairmount	83	23	48.0	2.4[illegible]	T.
Faribault	86	21	47.2	1.39	T.
Farmington	86	21	48.0	1.75	3.1
Fergus Falls	77	20	46.0	1.93	3.2
Fort Ripley	80	15	46.4	2.97	4.0
Glencoe	86	29	47.8	3.24	2.0
Grand Meadow	87	20	47.6	1.24	......
Hallock	74	13	42.8	0.39	T.
Halstad	80	17	43.4	1.38	......
Hinckley	80	16	45.1	3.42	
Hovland	50	18	33.0	1.05	
Lake Crystal	88	24	49.1	2.70	T.
Leech Lake	73	12	39.6	3.59	7.6
Little Falls	81	18	45.0	2.89	4.2
Long Prairie	79	14	45.3	2.03	6.0
Luverne	89	22	48.0	3.36	1.5
Lynd	86	16	45.0	2.05	6.5
Maple Plain	87	20	46.8	2.72	2.6
Milan	84	17	47.4	2.78	8.0
Minneapolis	85	21	46.8	2.37	1.1
Montevideo	86	20	47.6	2.62	4.2
Mora	81	15	43.8	3.68	2.8
Morris	80	18	45.9	1.92	6.8
Mount Iron	70	15	40.1	2.09	9.0
New London	85	16	44.4	1.90	
New Richland	85	22	48.9	0.95	T.
New Ulm	88	23	48.5	2.04	0.3
Park Rapids	79	18	43.2	3.11	5.1
Pine River	77	10	43.0	3.92	7.5
Pipestone	86	23	48.4	1.58	0.2
Pokegama Falls	74	14	41.8	2.57	6.5
Poplar	76	15	43.3	2.13	......
Redwing	82	27	49.6	0.81	
Redwood Falls	89	22	49.1	3.10	4.3
Reeds	......	......	......	0.73	
St. Charles	85	17	49.2	1.71	T.
St. Cloud	83	18	47.2	3.53	......
St. Peter	88	21[d]	45.8[e]	2.33	0.4
Sandy Lake Dam	74	18	43.4	2.99	3.5
Shakopee	85	20	48.4	2.43	T.
Stephens Mines	68	12	39.6	......	......
Two Harbors	70	15	40.8	1.34	3.0
Wabasha	87	22	51.1	1.12	T.
Wadena	74	17	43.6	2.17	3.5
Willow River	76	12	40.8	3.97	2.0
Windam	85	25	49.4	2.53	0.3
Winnebago	89	23	49.0	2.50	T.
Winnebegoshish	72	16	41.8	2.28	8.5
Winona	85	27	50.1	1.76	
Worthington	82	22	46.4	2.31	
Zumbrota	85	19	48.2	1.13	......
Mississippi.					
Aberdeen	87	43	66.4	10.48	
Agricultural College	90	44	68.2	9.06	
Austin	91	40	66.0	8.32	
Batesville	88	43	66.6	7.84	
Bay St. Louis	86	51	72.8	9.81	
Bellefontaine	87	42	66.9	8.36	
Biloxi	91	53	74.2	9.07	
Booneville	85	42	64.0	10.10	
Brookhaven	90	44	69.2	14.62	
Canton	88	45	68.6	6.44	
Clarksdale	86	42	65.4	8.97	
Columbus	87	45	67.2	7.62	
Corinth	86	43	63.0	9.26	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
***Mississippi*—Cont'd.**					
Crystal Springs	90	45	68.7	17.09	
Duck Hill	87	42	66.4	7.77	
Edwards	89	50	70.2	6.77	
Enterprise				14.28	
Fayette	85	45	67.5	15.47	
Fayette (near)				15.56	
Greenville	87	46	66.6	7.55	
Greenwood	89	45	67.6	9.10	
Hattiesburg		50		13.92	
Hazlehurst		45		15.84	
Hernando	85	41	63.7	10.28	
Holly Springs	88	42	64.4	8.45	
Indianola	89	45	66.6	8.48	
Jackson	88	46	69.0	11.62	
Kosciusko	87	43	66.6	6.82	
Lake	87	44	67.6	11.22	
Lake Como	88	46	68.2	15.29	
Leakesville	90	18	71.0	11.39	
Logtown	88	52	72.6	10.11	
Louisville	86	44	66.2	5.80	
McNeill	91	49	72.4	11.86	
Macon	87	45	67.2	8.34	
Magee	87	44	66.2	12.63	
Magnolia	88	47	70.5	17.45	
Monticello	90	46	70.1	14.84	
Natchez	88	45	69.5	16.61	
Okolona	86	45	65.7	10.03	
Pecan	87	54	71.8	8.44	
Pittsboro	89	41	65.4	6.08	
Pontotoc	81	46	64.4	9.44	
Porterville	88	46	67.6	9.33	
Port Gibson	89	42	68.2	11.48	
Quitman	87	47	69.0	15.49	
Ripley	87	40	63.4	7.89	
Shoccoe	91[d]	45[b]	69.3[c]		
Shubuta				12.98	
Suffolk	88	44	69.2	12.34	
Swan Lake				10.62	
Tenuia	88	46	69.3	4.24	
Tupelo	89	44	65.4	14.72	
University	86	42	64.4	10.00	
Utica	87	45	68.7	10.71	
Walnutgrove	85[e]	47[e]	66.5[e]	6.67	
Watervalley	88[e]	43[e]	65.8[d]	9.49	
Waynesboro	89	47	69.2	13.90	
Woodville	88	49	69.6	17.34	
Yazoo City	86	43	68.0	6.18	
Missouri.					
Albany				2.22	
Appleton City	85	26	57.8	8.65	
Arlington				5.30	
Arthur	86	26	59.9	6.41	
Avalon	86	22	58.6	5.38	
Bagnell				3.16	
Belle	89	33	60.8	4.70	T.
Bethany	86	17	55.4	2.74	4.5
Birchtree	85	37	60.2	8.21	
Bolivar	85	30	59.7	4.63	
Boonville				4.85	
Brunswick	87	26	58.0	4.31	2.0
Cape Girardeau				5.12	
Caruthersville	91	39	63.8	10.69	
Clinton	89	27	60.8	6.16	
Conception	83	26	54.7	1.46	1.5
Dean	87	34	61.2	5.09	
De Soto	87	34	59.9	7.43	
Doniphan	87	38	62.5	9.62	
Eldorado Springs	86	30	59.6	4.40	
Fairport				2.9[a]	8.0
Farmington	90	37	60.5	7.30	
Fayette	84[b]	36[b]	60.8[b]	4.15	
Fulton	86	31	59.4	4.37	
Gads Hill	90	36	61.4	5.61	
Gallatin				2.90	6.0
Gano	90	34	60.5	6.57	
Glasgow				4.66	
Goodland	88	33	59.1	5.54	
Gorin				6.34	1.5
Grant City	89	22	57.0	2.69	T.
Harrisonville	88	25	58.0	4.06	T.
Hazlehurst				2.17	4.0
Hermann				3.60	
Houston	86	34	59.2	8.50	
Huntsville				5.70	
Ironton	91	32	59.9	5.53	
Jackson	88	38	62.9	7.05	
Jefferson City	87	28	58.2	4.02	
Joplin	87	33	61.3	7.17	
Kidder	85	22	56.9	3.54	4.5
Koshkonong	87	36	60.3	10.89	
Lamar	86	30	59.4	5.16	
Lamonte				6.40	T.
Lebanon	87	30	58.6	6.27	
Lexington	86	25	58.0	4.94	
Liberty	86	24	58.4	4.93	5.0
Lakewood	85	31	59.6	6.00	T.
Louisiana	86	26	58.2	3.81	
Marblehill	89	37	61.4	7.99	
***Missouri*—Cont'd.**					
Marshall	85	25	58.4	5.41	T.
Maryville	91	25	55.6	1.71	2.0
Mexico	88	27	57.2	3.62	T
Monroe	85	27	57.2	2.65	T.
Mountain Grove	84	33	58.5	7.35	
Mount Vernon	88	31	59.2	7.03	
Neosho	86	34	61.0	6.18	
Nevada				4.92	
New Madrid				8.17	
New Palestine	85	25	59.2	5.06	
Oakfield	87	33	59.7	5.11	
Olden	88	35	60.9	7.68	
Oregon	88	25	57.7	1.39	2.0
Osceola				6.86	
Rolla				5.81	
St. Charles	88	31	59.8	4.43	
St. Joseph				2.00	4.0
Sarcoxie				6.53	
Seymour	85	32	58.0	9.20	
Sikeston	87	39	62.4	9.07	
Steffenville	86	26	57.4	4.24	
Subiett	84	22	57.0	5.47	4.0
Trenton	87	22	58.4	2.87	4.0
Unionville	84	20	54.8	5.28	4.0
Versailles	88	28	59.9	4.60	
Warrensburg	87	28	59.4	9.82	T.
Warrenton	89	31	58.9	4.94	
Warsaw	90	28	60.5	6.18	
Wheatland				4.19	
Willowsprings	86	37	61.8	9.37	
Windsor	84	26	58.4	7.04	
Montana.					
Adel	72	18	44.7	2.67	
Anaconda	78	20	46.7	0.58	
Augusta	74	19	45.6	2.62	3.0
Babb	70	21	42.2	2.45	10.5
Bear Creek	92	21	48.4	2.02	3.5
Billings	81	27	51.8	4.63	0.5
Bozeman	71	23	46.1	3.16	
Bowen	80	20	43.4	0.57	
Broadview	74	22	47.6	3.60	0.3
Busby	83	20	47.8	2.93	T.
Butte	73	22	47.0	1.25	
Canon Ferry	77	22	51.0	1.52	
Cascade	78	20	50.1	3.04	0.8
Chester	75	22	48.6	1.60	
Chinook	76	18	45.8	2.09	
Choteau	75	22	47.4	1.50	
Columbia Falls	81	24	50.5	0.87	
Copper				2.70	6.0
Crow Agency	80	24	50.6	4.62	T.
Dayton	80	25	51.2	1.36	
Decker	80	24	46.2	5.00	T.
Dillon	70	28	50.8	3.03	T.
Ekalaka	73	13	46.1	3.54	
Ericson				5.42	
Evans	74	23	45.2	9.20	2.5
Fallon	79	18	48.0	2.57	7.0
Forsyth	80	20	49.0	4.71	1.0
Fort Benton	80	24	50.6	1.39	
Fort Harrison	72	22	44.5		
Fort Logan	68	12	43.6	0.17	
Fortine	82	19	48.4	1.78	
Glasgow	79	20	49.4	1.50	
Glendive	78	20	48.4	1.90	
Gold Butte	72	10	39.9	2.43	2.6
Grayling	67	17	41.2	1.57	T.
Greatfalls	74	25	49.8	1.74	2.0
Hamilton	83	25	51.4	0.46	
Highwood				2.27	0.8
Home Park				2.12	
Huntley	79	23	50.4	4.23	T.
Jordan	76	20	44.7	2.51	0.1
Lewistown	75	21	46.8	2.25	T.
Livingston	74	25	49.0	3.93	T.
Lodge Grass	80	23	49.6	4.39	
Malta	74	22	47.4	2.09	
Marysville	65	15	42.8	2.34	9.5
Missoula	82	25	54.8	0.20	
Moore				2.34	2.0
Mulletts Ranch				1.80	
Norris	76	27	50.0	3.68	T.
Nye				4.89	21.5
Ovando				0.59	
Philipsburg	78	18	45.6	0.84	
Plains	82	28	52.4	0.08	
Polson	84	30	52.0	0.31	
Poplar	79	18	45.2	1.98	2.0
Raymond				2.25	4.9
Redlodge	69	20	42.2	4.28	13.7
Renovo	78	19	49.6	1.85	
Saltese				0.13	
Snowshoe	73	16	46.3	2.25	1.0
Springbrook	78	16	46.2	2.88	1.5
Steele	73	26	49.4	2.99	5.0
Tokna	78	18	48.0	1.93	
Townsend				0.97	
Tosten	80	17	50.0	1.63	
***Montana*—Cont'd.**					
Troy				1.42	
Utica	72	17	45.2	3.21	12.0
Valentine	80	24	49.2	1.67	T.
Warwick	72	13	43.8	2.32	
Wolf Creek	79	21	47.5	1.56	
Nebraska					
Agate	82	17	47.8	2.95	4.0
Ainsworth	90	22	51.4	4.17	1.0
Albion	91	25	54.4	3.07	2.0
Alliance	86	21	51.1	3.92	0.5
Alma	93	23	56.4	1.66	5.0
Anoka				2.65	0.5
Arapahoe				2.86	8.0
Arcadia				1.94	3.0
Ashland	93	26	56.6	5.13	1.0
Ashton				1.70	T.
Aurora	93	22	55.6	4.10	3.0
Beatrice	94	24	58.0	2.03	3.0
Beaver	96	27	57.0	2.56	6.0
Bellevue	88	24	56.2	1.51	1.0
Benkleman				1.45	T.
Blair	88	25	55.2	3.60	
Blue Hill				4.00	3.0
Blue Springs				1.39	2.3
Bradshaw				5.12	
Bidgeport	86	17	51.0	3.64	2.0
Brokenbow	94	19	53.4	2.60	2.0
Burchard				1.43	2.0
Burwell				4.09	1.0
Callaway	93	21	54.5	3.95	5.0
Central City				3.36	
Chester				1.33	4.0
Crete	93	25	57.5	3.17	2.6
Culbertson	94	23	58.6	1.99	4.0
David City	89	24	55.2	3.80	2.8
Dawson	94	24	58.4	1.07	5.0
Dubois				2.03	3.5
Duff				4.20	5.0
Dunning				2.60	
Edgar				2.88	3.0
Ellis				1.40	
Ericson				3.65	0.5
Ewing	91	25	51.2	3.53	2.5
Fort Robinson	85	7	46.8	3.84	5.0
Franklin	96	23	56.2	1.56	4.5
Fremont	88	26	55.0	3.26	1.5
Fullerton	95	24	55.5	2.89	T.
Geneva	97	24	57.0	3.02	5.0
Genoa (near)	90	25	55.4	2.04	2.0
Gering				4.69	
Gosper				3.77	4.0
Gothenburg	96	22	55.2	2.79	5.0
Grant	90	12	50.6	3.13	6.0
Greeley				2.21	
Guide Rock				1.71	6.0
Halsey	92	20	53.8	4.34	4.6
Hastings*[1]	93	24	56.0	3.63	7.0
Hayes Center	92	18	54.3	2.07	7.0
Hay Springs	87	17	49.2	4.42	2.5
Hebron	96	26	56.6	1.53	4.0
Hendley				1.95	5.0
Hickman				2.10	
Holdrege	96	23	57.2	3.99	7.0
Hooper*[1]	90	28	55.0	1.37	0.5
Imperial	90[g]	15[g]	51.2[g]	1.92	5.2
Kennedy	91	21	53.2	2.55	4.0
Kimball	97	8	50.0	3.18	3.0
Kirkwood	92	19	51.4	3.87	2.0
Leavitt	90	24	55.2	2.57	
Lexington	96	17	53.9	2.05	5.0
Lodgepole[j]	85	10	49.6		
Loup	95	20	55.0	1.48	3.0
Lynch	96	26	52.0	2.25	2.0
McCook				2.62	6.0
McCool				4.51	5.0
Madison	90	25	53.6	1.87	T.
Marquette				3.14	3.5
Minden	96	24	54.6	2.64	5.5
Monroe				1.99	0.7
Nebraska City	92	23	57.4	1.10	3.0
Nemaha				0.68	1.0
Norfolk	93	25	53.4	3.22	0.6
North Loup	97	23	55.2	2.35	3.0
Oakdale	94	26	53.2	1.87	1.2
Oakland	85	24	53.6	1.00	
Odell				2.00	6.0
Ord				2.25	
Osceola	98[e]	24[e]	57.2[e]	3.92	3.0
Palmer				2.30	2.0
Palmyra*[1]	94	26	56.8	4.75	2.5
Pawnee City	92	22	57.3	1.17	2.0
Plattsmouth				1.42	1.0
Plymouth	94	25	57.8	2.10	3.4
Purdum	91	18	52.4		6.0
Ravenna	93	23	54.8	1.93	8.0
Redcloud	97	21	55.3	1.25	6.0
Rulo				3.40	2.0
St. Libory				4.39	4.0

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
	°	°	°	Ins.	Ins.
Nebraska—Cont'd.					
St. Paul	93	25	56.4	2.66	3.0
Santee	94	26	54.8	2.26	2.5
Schuyler	......	......	......	1.75	1.0
Scottsbluff	87	15	50.0	3.04	1.5
Seward	90	25	54.7	7.13	2.0
Springview	88	21	51.0	2.54	T.
Stanton	91	21	54.8	1.78	......
Strang	......	......	......	2.40	2.0
Stratton	......	......	......	2.40	4.0
Superior	90	25	56.4	1.56	5.0
Syracuse	......	......	......	2.95	1.5
Tablerock	......	......	......	1.25	3.0
Tecumseh	94	21	58.1	1.15	2.0
Tekamah	90	23	54.8	1.66	T.
Turlington	94	25	55.8	1.76	T.
University Farm	93	26	57.2	3.66	2.0
Wakefield	92	24	53.6	2.59	0.7
Watertown	......	......	......	2.59	5.0
Wauneta	......	......	......	3.16	3.0
Weeping Water	......	......	......	2.23	2.5
Westpoint	91	26	54.8	1.28	T.
Wilber	......	......	......	3.35	3.0
Wilsonville	......	......	......	2.75	2.0
Winnebago	91	21	53.6	3.21	T.
Wisner	......	......	......	2.44	T.
York	96	25	56.0	4.72	4.0
Nevada.					
Amos	87	23	52.8	0.25	
Aura	68	26	45.8	1.21	T.
Battle Mountain	68	27	44.7	T.	T.
Beowawe	......	......	......	0.01	
Carlin	78	35	52.0	T.	
Carson Dam	80	34	56.4	0.31	
Clover Valley	77	25	49.8	1.08	
Columbia	84	31	54.6	T.	T.
Elko *[1]	80	40	52.5	T.	
Eureka	78	24	48.5	2.62	24.0
Fallon	88	29	56.3	0.39	
Fenelon	77	27	47.3	......	......
Fernley	89	32	58.2	0.44	
Geyser	78	15	45.8	0.67	T.
Golconda	84	31	55.2	0.75	
Halleck	85	28	52.6	0.30	T.
Hamilton	71	18	43.0	1.84	T.
Hazen	89	25	56.4	0.08	
Humboldt	86	33	46.9	......	......
Leetville	89	32	57.8	0.04	
Lewers Ranch	85	27	52.2	0.81	T.
Logan	99	42	69.1	T.	
McAfees Ranch	90	13	47.4	0.60	
McGill	78	25	49.4	1.41	T.
Mill City *[1]	......	......	......	0.03	
Palmetto	82	22	46.6	1.40	8.0
Paradise Valley	......	......	......	0.82	
Pioche	89	26	54.5	0.31	T.
Potts	81	15	46.5	0.50	
San Jacinto	83[g]	22[g]	49.0[g]	0.77	T.
Squaw Valley	91	23	51.3	0.43	T.
Tecoma	85	29	52.6	0.22	
Wabuska	88	25	55.6	0.61	T.
Wells	78	31	49.9	......	
New Hampshire.					
Alstead	84	25	48.8	2.91	
Bethlehem	73	24	45.9	2.73	2.5
Brookline	82	30	52.8	2.99	T.
Durham	80	30	50.6	1.89	
Franklin Falls	86	27	50.5	2.45	0.2
Grafton	84	20	48.4	2.30	T.
Hanover	82	26	49.3	3.24	0.3
Keene	90	23	51.0	2.76	T.
Nashua	84	29	52.8	2.16	T
Newton	78	27	49.0	1.78	T.
Plymouth	83	24	49.6	2.84	
New Jersey.					
Asbury Park	83	35	53.6	5.46	
Bayonne	87	34	55.0	4.44	
Belvidere	91	29	55.8	2.51	
Bergen Point	87	34	55.2	4.69	
Beverly	88	33	56.9	6.01	
Boonton	......	......	......	4.77	
Bridgeton	85	31	58.6	6.48	
Canton	......	......	......	5.66	
Cape May C. H.	80	32	56.1	6.78	
Charlottsburg	82	29	53.0	3.80	
Clayton	84	32	56.4	5.18	
College Farm	86	29	55.0	4.50	
Dover	86	28	53.6	3.67	
Elizabeth	90	34	56.8	4.55	
Englewood	83	35	55.6	4.35	
Flemington	87	29	55.6	4.34	
Friesburg	83	29	56.4	5.25	
Hightstown	85	31	55.2	5.79	
Imlaystown	87	32	55.8	3.07	
Indian Mills	90	30	57.0	6.03	
Jersey City	83	35	56.4	4.55	
Lakewood	89	31	55.3	5.96	
Lambertville	88	31	56.4	4.57	
Layton	89	22	52.9	2.59	T.
New Jersey—Cont'd.					
Moorestown	85	32	55.8	5.34	
Newark	88	33	55.8	6.45	
New Brunswick	86	28	54.8	4.30	
Newton	90	24	53.9	2.81	
Oceanic	82	37	55.4	5.80	
Paterson	90	34	57.0	3.72	T.
Phillipsburg	89	31	55.9	3.32	
Plainfield	86	30	54.8	4.09	
Pleasantville	......	......	......	7.15	
Rancocas	......	......	......	5.29	
Rivervale	85	25	52.6	4.12	
Somerville	88	28	55.7	4.53	
South Orange	84	32	54.4	5.02	
Sussex	89	27	54.4	3.21	T.
Toms River	86[g]	30[e]	55.6[f]	7.34	
Trenton	82	33	56.4	6.27	
Tuckerton	84	31	54.5	5.82	
Vineland	85	30	56.9	8.00	
Woodbine	82	31[d]	55.8[b]	7.16	
New Mexico.					
Alamagordo	90	35	63.6	0.23	
Albert	87	30	59.3	1.30	
Albuquerque	81[d]	31[a]	56.5[c]	1.42	
Alto	......	......	......	0.41	
Bellranch	88	32	59.6	2.42	
Bloomfield	90	27	55.9	0.58	T.
Cambray	......	......	......	0.23	
Carlsbad	94	37	66.3	0.34	
Chama	75	20	45.5	3.71	15.0
Cimarron	78	24	50.4	2.32	22.0
Cliff	95	32	60.9	0.78	
Cloudcroft	70	19	45.0	1.82	2.0
Datil	92	19	49.8	1.10	
Deming	89	36	62.6	0.39	
Dorsey	78	26	51.7	2.96	1.0
Dulce	81	22	48.8	1.71	0.1
Eagle Rock Ranch	78	23	50.0	3.41	7.0
Elizabethtown	69	11	42.6	1.20	12.0
Elk	81	30	56.2	0.37	
Espanola	82	30	53.6	0.99	T.
Fort Bayard	87	34	58.3	1.07	
Fort Stanton	81	25	53.8	0.20	
Fort Union	75	18	46.8	1.39	......
Fort Wingate	77	27	51.4	0.86	1.0
Fruitland	87	29	56.8	0.55	
Gage	90	34	62.3	0.62	
Glen	86	33	60.8	1.01	
Hillsboro	85	36	60.9	1.22	
Laguna	83	33	55.1	0.25	
Lagunita	84[d]	28[d]	57.6[d]	3.28	
Lake Valley	......	......	......	0.46	
Las Vegas	82	24	51.8	2.57	T.
Logan	88	32	60.7	1.24	
Lordsburg	96	38	64.4	0.60	
Los Alamos	......	......	......	3.07	T.
Los Lunas	87	33	59.4	2.09	
Magdalena	78	29	35.3	0.92	T.
Manuelito	......	......	......	1.07	3.0
Mesilla Park	90	36	64.0	0.22	
Mineral Hill	......	......	......	2.88	4.0
Monument	91	30	64.4	0.90	
Mountain Air	82	30	52.9	4.24	4.0
Nara Visa	85	29	59.8	1.79	
Orange	92	31	62.4	T.	
Red River	......	......	......	3.08	22.0
Redrock	......	......	......	0.30	
Rincon	88	37	63.2	0.24	
Rociada	72	18	45.3	3.01	12.0
Rosa	......	......	......	1.82	......
Rosedale	74	31	52.4	1.40	T.
San Marcial	92	33	63.0	......	
San Rafael	82	30	54.1	1.67	
Socorro	90	32	61.7	1.15	
Springer	84	22	52.8	0.49	2.0
Strauss	......	......	......	T.	
Taos	79	25	50.4	1.80	2.0
Tres Piedras	77	20	45.7	1.90	......
Tucumcari	86	33	61.7	2.30	
Valley	......	......	......	1.05	
Vermejo	76	18	45.4	1.98	3.0
Winsors	74	10	41.6	2.45	4.0
New York.					
Adams	84	28	51.7	4.02	6.5
Addison	88	23	52.0	2.24	2.0
Allegany	88	22	49.9	4.20	3.0
Amsterdam	86	24	50.4	3.69	0.5
Angelica	86	19	49.2	2.49	3.0
Appleton	85	27	49.7	3.11	4.0
Arcade[f]	87	22	51.4	......	
Athens	87	29	53.0	3.43	T.
Atlanta [f]	85	23	49.4	......	
Auburn	85	28	51.0	3.05	2.0
Avon	84	25	49.6	2.94	4.0
Baldwinsville	82	20	47.2	4.97	6.0
Balston Lake	85	26	50.3	3.69	3.0
Bedford	87	26	53.8	4.50	
Blue Mountain Lake	......	......	......	3.71	17.5
Bolivar	85	19	49.6	3.50	2.0
New York—Cont'd.					
Bouckville	81	21	47.8	3.28	6.0
Brockport	88	27	50.5	3.26	3.0
Cape Vincent	80	28	47.4	2.90	T.
Carmel	84	25	51.8	4.77	
Carvers Falls	81	25	50.3	3.50	T.
Chatham	89	24	53.0	3.54	
Chazy	80	25	49.0	2.99	T.
Coeymans	93	26	54.4	4.00	
Cooperstown	82	26	49.2	2.62	T.
Cortland	85	23	48.2	3.39	
Cutchogue	78	33	52.0	5.29	
De Ruyter	83	21	47.4	2.53	3.2
Easton	......	......	......	4.06	1.0
Elba	80	26	47.4	3.62	5.2
Fayetteville	85	26	51.6	2.88	4.0
Fort Plain	84	27	52.9	3.08	T.
Franklinville	84	20	48.0	3.05	1.0
Gabriels	82	16	47.9	1.87	T.
Gansevoort	......	......	......	3.62	2.0
Glens Falls	80	27	51.6	3.57	T.
Gloversville	85	26	50.5	3.26	1.0
Greenfield	86	28	50.8	4.42	1.0
Greenwich	86	22	51.2	3.95	0.8
Griffin Corners	83	15	47.6	2.42	0.5
Harkness	78	26	48.4	1.11	
Haskinville	......	......	......	2.04	2.0
Hemlock	82	28	49.4	1.93	4.0
Hunt	90	22	50.6	2.51	3.0
Indian Lake	84	19	47.3	3.35	
Jamestown	83	26	50.9	4.57	2.0
Jeffersonville	82	20	49.9	2.53	T.
Keene Valley	82	20	46.8	1.52	5.0
Kings Ferry	......	......	......	2.83	3.8
Lake George	81	26	51.1	3.19	T.
Le Roy	86	27	50.4	3.26	3.0
Liberty	82	24	49.4	2.92	
Littlefalls, City Res.	83	25	49.6	3.52	3.0
Lowville	80	24	47.8	2.64	
Lyndonville	......	......	......	3.28	......
Lyons	85	29	51.8	5.42	6.5
Middletown	85	30	52.7	3.31	
Mohonk Lake	85	23	50.3	4.16	T.
Moira	88	19	48.7	2.46	4.0
Mount Hope	87	28	54.1	7.31	
Newark Valley	......	......	......	2.41	1.5
New Lisbon	83	18	46.9	2.33	1.0
North Hammond[d]	88	23	49.6		
North Lake	81	16	46.6	4.53	6.0
Norwich	85	24	52.4	4.48	0.5
Ogdensburg	......	......	......	2.47	T.
Oneonta	87	24	51.8	3.33	T.
Otto	82	26	53.5	0.79	
Oxford	83	24	50.8	3.11	0.6
Oyster Bay	83	35	54.5	4.48	
Penn Yan	86	26	50.6	2.06	3.0
Perry City	85	20	48.6	2.99	4.0
Philadelphia	84[e]	26[e]	50.4[e]	2.66	
Plattsburg	82	28	49.9	2.95	
Port Jervis	90	27	53.4	2.72	
Richland	85	32	55.6	2.64	2.0
Rose	85	26	49.3	3.57	3.5
Salisbury Mills	84	22	52.6	3.33	
Scarsdale	83	26	53.4	2.62	
Setauket	83	35	53.2	5.25	
Shortsville	87	26	50.2	2.30	4.2
Skaneateles	......	......	......	3.04	
Southampton	70	32	51.2	5.37	T.
South Canisteo	85	23	49.3	2.93	4.0
Spier Falls	80	26	50.7	3.72	T.
Taberg	83	21	49.6	4.34	5.2
Ticonderoga	78[i]	35[i]	52.7[i]	1.11	
Trudeau	78	19	46.0	2.13	T.
Volusia	80	26	49.4	3.79	3.0
Wading River	84	32	52.1	5.40	
Wappinger Falls	88	28	54.1	4.61	
Warwick	......	......	......	2.73	
Watertown	83	27	49.8	4.21	T.
Waverly	90	21	52.3	2.09	1.0
Wedgwood	85	24	49.2	3.21	4.3
West Berne	87	21	50.0	3.44	1.0
Westfield	84	24	50.0	5.08	4.0
Westpoint	87	28	52.8	3.11	
Windham	85	20	49.3	3.00	T.
Youngstown	......	......	......	3.60	3.0
North Carolina.					
Beaufort	83	52	68.4	5.16	
Brevard	88	34	61.4	4.71	
Brewers	90	34	63.0	2.87	
Buck Springs	78	19	53.1	......	
Carl	92[a]	36[a]	67.2[a]	5.71	
Chalybeate Springs	91	35	66.8	4.93	
Chapelhill	91	39	66.0	3.78	
Clinton	86	42	67.6	4.08	
Eagletown	89	38	69.2	4.75	
Edenton	87	40	64.6	6.10	
Fayetteville	90	41	67.8	4.13	
Goldsboro	96	42	67.9	4.72	
Graham	85	......	......	1.38	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Carolina—Cont'd.	°	°	°	*Ins.*	*Ins.*
Greensboro	94	41	66.2	2.71	
Greenville	.....	.....	.....	6.17	
Henderson	.....	.....	.....	2.61	
Hendersonville	84	37	61.8	5.69	
Hot Springs	90	36	64.7	4.97	
Kinston	95	40	68.7	5.56	
Lenoir [b]	94	38	64.4	.....	
Lexington	92	38	65.7	2.49	
Lincolnton	85	40	64.4	.....	
Louisburg	89	39	65.8	3.57	
Lumberton	93	40	69.2	4.71	
Manteo	85	40	63.8	6.66	
Marion	90	39	64.6	4.20	
Moncure	90	37	66.4	3.61	
Monroe	89	37	65.3	4.34	
Morganton	88	36	63.4	2.73	
Mountairy	90	32	62.3	2.40	
Mount Holly	.....	.....	.....	3.94	
Murphy	.....	.....	.....	5.64	
Nashville	93	39	66.6	5.57	
New Berne	91	43	67.8	6.20	
Patterson*[b]	84	34	60.8	4.44	
Pinehurst	89	42	68.6	5.71	
Ramseur	94	35	66.4	5.15	
Randleman	.....	.....	.....	2.57	
Reidsville	93	38	65.2	1.69	
Rockingham	.....	.....	.....	5.75	
Salem	89	37	64.1	3.19	
Salisbury	91	38	66.5	3.13	
Sapphire	79	33	58.4	7.45	
Scotland Neck	91	42	66.6	7.42	
Selma	92[h]	40[g]	67.1[h]	5.92	
Settle	93	35	63.9	7.93	
Sloan	88	39	67.4	6.45	
Snowhill	91	40	67.7	6.67	
Southern Pines	92	41	68.7	5.44	
Southport	84	50	69.4	6.02	
Statesville	89	25	63.8	3.02	
Tarboro	93	41	67.3	3.83	
Vade Mecum	88	31	61.2	1.75	
Washington	90	40	67.5	4.44	
Wash Woods	81	47	62.8	4.10	
Waynesville	80	34	59.2	4.56	
Weldon	92	41	66.0	4.38	
North Dakota.					
Amenia	84	16	45.5	1.88	3.5
Aplin	76	12	44.4	2.15	5.0
Beach	81	11	44.4	1.97	.....
Berlin	68[l]	9	40.8[f]	3.23	15.0
Bottineau	72	15	41.1	0.16	T.
Buford	76	15	45.2	1.71	2.0
Cando	76	8	41.8	0.13	3.0
Chilcot	75	16	42.6	0.50	1.2
Coalharbor	76	13	44.4	1.39	6.0
Cooperstown	77	10	44.4	0.18	.....
Crosby	72	17	41.8	0.71	T.
Dickinson	75	11	44.5	1.36	0.2
Donnybrook	75	10	42.4	0.20	0.5
Edgeley	74	11	45.0	1.89	3.5
Edmore	80	12	45.0	0.25	T.
Flasher	79	8	44.8	1.55	0.5
Forman	75[f]	20[f]	48.8[f]	1.54	5.0
Fort Berthold	80	9	45.0	0.59	2.0
Fort Yates	75[e]	20[e]	47.6[e]	2.03	4.1
Fullerton	80	13	44.8	3.17	12.6
Gladys	75	12	42.1	1.08	1.0
Glenullin	80	11	45.1	0.59	
Goforth	73	14	45.0	2.89	3.0
Grafton	75	19	44.6	T.	T.
Granville	76	16	44.0	0.16	0.5
Hamilton	74	19	41.4	1.15	1.5
Hannah	74	8	41.2	0.10	1.0
Hillsboro	78	15	45.6	1.37	5.0
Hurd	79	14	49.3	3.27	
Jamestown	82	11	46.8	1.39	
Kulm	76	16	44.9	3.81	9.5
Lakota	75	11	42.7	0.33	1.0
Langdon	73	12	39.6	0.55	T.
Larimore	75	10	42.8	0.52	.....
Lisbon	81	13	43.8	2.36	7.0
McKinney	75	10	42.2	0.25	1.0
Manfred	80	13	44.4	0.49	2.5
Mayville	78	15	44.5	0.40	3.0
Medora	76	12	45.7	0.83	.....
Melville	83	6	41.7	1.24	4.0
Minot	79	10	44.2	0.16	0.8
Minto	75	18	41.5	0.53	.....
Napoleon	79	8	43.2	1.32	7.3
New Salem	77	11	45.0	1.20	0.5
Oakdale	74	14	43.4	1.29	4.0
Oriska	79	13	44.5	1.33	8.0
Palermo	73	10	41.1	0.25	15.0
Park River	74	14	43.8	0.49	0.7
Pembina	75	15	42.0	1.05	7.0
Portal	70	12	40.5	0.65	.....
Power	81	13	44.6	1.98	0.8
Pratt	76	15	43.4	0.26	2.2
Steele	78	11	46.4	1.38	5.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
North Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
University	76	14	44.4	0.68	.....
Valley City	80	12	45.8	1.50	9.0
Wahpeten	79	18	46.2	1.41	.....
Westhope	74[k]	20[l]	47.8[l]	0.07	
Willow City	80	16	43.4	T.	T.
Wishek	76	14	45.4	2.70	12.0
Ohio.					
Akron	81	30	52.7	3.36	T.
Amesville	88	30	59.8	4.00	
Bangorville	81	29	52.8	4.43	T.
Bellefontaine	80	28	52.2	4.13	T.
Benton Ridge	84	29	53.8	3.13	0.5
Bladensburg	83	25	54.8	4.00	T.
Bowling Green	84	29	52.4	2.46	T.
Bucyrus	82	28	52.1	5.71	T.
Cadiz	84	30	55.4	4.16	T.
Cambridge	83	27	55.3	3.95	
Camp Dennison	88	21	59.0	2.17	
Canal Dover	81	27	53.0	3.40	T.
Canton	80	30	52.6	2.52	
Circleville	86	33	57.4	2.91	
Clarington	85	31	58.0	4.40	T.
Clarksville	83	33	57.4	3.21	
Cleveland *b*	82	32	51.2	2.71	T.
Columbus	82	34	56.4	6.28	
Dayton	83	30	56.2	3.17	
Defiance	83	27	52.4	4.65	T.
Delaware	82	28	53.8	3.68	T.
Demos	83	31	55.0	4.00	T.
Findlay	83	29	53.8	3.29	
Frankfort	87	32	58.6	2.21	
Fremont	85	29	53.9	3.00	T.
Garrettsville	81	24	50.9	3.47	0.1
Granville	83	29	54.4	4.34	
Gratiot	84	27	54.4	5.13	
Green	87	34	59.3	3.83	
Greenhill	80	24	50.6	2.57	
Greenville	85	30	55.6	2.46	
Hedges	85	27	53.2	4.88	T.
Hillhouse	82	24	50.6	3.93	1.5
Hiram	80	29	51.8	3.09	T.
Hudson	87	24	51.4	3.52	
Ironton	89	33	61.8	5.58	T.
Jacksonburg	88	32	56.5	3.25	
Jeffersonville	83[d]	31[d]	55.7[d]	2.50	
Kenton	82	29	51.4	3.30	
Killbuck	83	28	53.4	3.46	
Lancaster	83	32	56.2	3.04	
Lima	81	29	54.1	2.26	T.
McConnelsville	84	30	56.2	3.14	
Marietta	87	29	60.5	3.55	
Marion	85	28	54.0	4.60	T.
Medina	82	24	51.8	3.52	
Milfordton	80	25	52.9	3.79	
Milligan	84	30	56.0	3.94	
Millport	81	25	52.0	2.39	T.
Montpelier	82	27	52.6	4.79	1.0
Napoleon	81	29	52.6	4.19	1.0
Nellie	79	30	54.4	2.63	T.
New Alexandria	82	28	55.8	3.85	
New Berlin	80	27	51.6	2.81	
New Bremen	82	29	55.3	2.63	T.
New Richmond	86	36	59.6	3.68	.....
New Waterford	82	26	52.6	3.50	T.
North Lewisburg	86	28	55.8	3.45	
North Royalton	80	29	51.0	3.54	
Norwalk	83	27	51.9	2.90	
Oberlin	83	27	52.1	3.63	.....
Ohio State University	83	29	55.0	4.55	
Ottawa	85	28	53.6	3.14	T.
Pataskala	82	28	55.0	4.09	
Philo	82	32	56.6	3.70	
Plattsburg	82	31	55.1	3.52	
Pomeroy	89	32	59.4	5.04	
Portsmouth	87	36	59.8	3.13	
Pulse	85	33	58.0	2.30	
Rittman	83	25	50.8	2.15	
Rockyridge	86[a]	30[c]	52.0[d]	3.06	T.
Rome	84[e]	24[e]	51.2[e]	2.86	1.0
Shenandoah	81	28	51.0	4.51	T.
Sidney	84	31	56.0	2.59	
Somerset	85	32	56.6	5.00	
South Lorain	85	25	52.2	2.98	T.
Springfield	.....	.....	.....	2.86	
Summerfield	82	29	56.4	3.73	
Thurman	89	31	60.8	3.69	
Tiffin	82	31	53.4	2.53	T.
Toledo (St. Johns College)	83	29	52.6	2.54	0.6
Upper Sandusky	81	28	53.8	3.78	T.
Urbana	85	28	55.4	2.96	
Vickery	83	27	51.8	2.72	T.
Warren	84	26	52.0	2.72	0.5
Wauseon	84	26	51.3	2.72	1.2
Waverly	89	31	59.3	3.11	
Waynesville	82	33	56.6	2.73	
Wellington	83	27	52.8	4.20	
Willoughby	.....	.....	.....	2.17	0.5
Wilson	86	31	59.4	2.67	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Wooster	81	29	52.8	3.48	T.
Zanesville	.....	.....	.....	5.59	
Oklahoma.					
Alva	96	29	61.2	3.39	
Arapaho	94	29	61.2	2.01	
Brule	93	25	61.6	1.15	T.
Cache	91	29	61.0	7.37	
Chandler	93	33	61.6	5.57	
Chattanooga	93	33	62.9	6.87	
Cloud Chief	92	30	62.2	6.71	
Dacoma	98	30	60.2	4.77	
Enid	91	31	61.0	3.55	
Erick	95	25	61.0	3.41	
Fort Reno	92	31	61.6	6.99	
Fort Sill	92	35	64.2	4.50	
Gage	94	25	59.2	2.07	
Grand	83	24	55.9	2.68	
Guthrie	92	35	61.6	5.78	
Harrington	93	22	59.6	1.34	
Helena	93[c]	30[c]	59.0[c]	2.85	
Hennessey	89	33	61.5	3.90	
Hobart	101	31	63.3	8.37	
Hooker	93	28	59.8	3.19	
Jefferson	91	32	60.5	5.50	
Kenton	90	27	57.3	3.97	T.
Kingfisher	92	33	62.3	5.17	
Mangum	96	33	63.6	5.45	
Meeker	91	33	60.1	2.50	
Neola	91	33	61.4	7.63	
Newkirk	93	31	62.6	4.20	
Okeene	92	30	61.4	5.10	
Pawhuska	89	30	61.4	3.20	
Perry	89	32	61.6	4.18	
Sac and Fox Agency	89	35	62.4	4.87	
Shawnee	90	35	61.9	3.60	
Snyder	94	34	63.0	6.18	
Stillwater	90	30	59.8	4.32	
Waukomis	90	36	61.1	3.92	
Weatherford	90	30	60.8	5.10	
Whiteagle	91	33	61.1	3.18	
Oregon.					
Alba	.....	.....	.....	1.36	
Albany	92	32	58.0	1.28	
Alpha	92	30	57.0	3.34	
Ashland	89	38	57.1	1.92	
Astoria	73	45	56.2	2.51	
Aurora (near)	86	36	57.2	1.73	
Bay City	73	33	52.4	3.76	
Bend	85	22	52.0	1.42	
Blalock	.....	.....	.....	0.83	
Buckhorn	92	28	55.8	3.85	
Bullrun	90	33	57.0	3.42	
Burns	83	30	54.6	0.51	
Carlton	90	31	55.6	0.97	
Cascade Locks	88	39	59.4	1.87	
Coquille	.....	.....	.....	2.92	
Corvallis	89	32	57.1	1.27	
Dale	.....	.....	.....	1.57	
Dayville	96	30	58.9	0.92	
Doraville	89	35	55.3	1.21	
Drain	95	30	57.1	0.98	
Echo	93	35	60.6	1.48	
Ella	93	40	60.7	0.56	
Eugene	85	33	56.8	1.38	
Fairview	85	35	55.0	4.34	
Falls City	86	31	55.0	2.07	
Forestgrove	89	31	56.1	1.00	
Gardiner	86	36	54.6	4.01	
Glendale	94	27	57.0	1.30	
Glenora	93	29	55.8	3.08	
Gold Beach	70	29	52.8	4.23	
Government Camp	79	30	46.8	1.81	3.0
Granite	84	22	46.5	0.20	
Grants Pass	98	28	57.6	1.13	
Grass Valley	90	20	50.7	0.90	
Heisler	88	28	56.5	1.44	
Heppner	85	34	57.5	1.04	
Hood River	91	37	60.0	0.37	
Huntington	88	36	61.6	0.67	
Jacksonville	94	34	57.4	1.31	
Joseph	83	29	50.9	2.52	T.
Klamath	87	28	53.8	0.23	
Lagrande	87	31	55.8	1.04	
Lakeview	85	23	50.5	1.40	1.5
Lost River	81	25	50.6	1.45	
McKenzie Bridge	94	25	58.8	2.90	
McMinnville	90	31	57.5	1.04	
Marshfield	75	38	54.3	3.91	
Mill City	92	30	56.4	1.17	
Monroe	86	33	55.8	1.05	
Mountain Park	85	35	56.8	0.82	
Mount Angel	90	40	59.3	2.54	
Nehalem	.....	.....	.....	3.60	
Newport	78	40	55.2	2.01	
Odell	.....	.....	.....	2.71	
Olex (near)	86	35	59.0	0.82	
Ontario	.....	.....	.....	0.10	
Orseco	79[b]	29[c]	46.6[c]	4.22	10.0

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Oregon—Cont'd.	°	°	°	*Ins.*	*Ins.*
Paisley	83	31	52.9	1.62	
Pendleton	91	34	59.2	0.86	
Port Orford	69	42	53.3	4.64	
Prineville	86[d]	25[d]	51.6[d]	0.81	
Richland	91	31	58.0	0.29	
Riverside	95	20	52.4	1.15	
Salem	86	36	58.2	0.92	
Silver Lake	74	14	48.0	2.17	
Sparta	79	29	51.8	0.48	
Stafford	90	38	57.8	1.34	
Sumpter	70	23	42.6	......	
The Dalles	91	39	63.0	0.41	
Toledo	83	36	54.2	3.07	
Umatilla	96	40	65.2	0.89	
Van	......	......	......	0.65	
Wallowa	88	23	50.6	2.01	
Wamic	87	27	54.3	0.74	
Warm Spring	90	25	56.7	0.83	
Weston	88	33	59.0	1.26	
Williams	95	29	57.4	1.64	
Pennsylvania.					
Aleppo	85	28	57.0	3.60	
Altoona	85	25	53.4	2.42	
Baldwin	82	25	53.2	3.69	T.
Bellefonte	89	29	57.3	2.38	
Browers Lock	......	......	......	4.03	
California	85	30	58.5	3.07	
Cassandra	85	24	53.4	2.43	T.
Centerhall	77	30	53.9	2.19	
Clarion	......	......	......	2.76	
Claysville	87	27	56.0	3.83	T.
Clearfield	......	......	......	2.90	
Coatsville	89	31	56.6	2.77	
Confluence	......	......	......	4.06	
Davis Island Dam	......	......	......	2.98	
Derry	84	27	56.5	2.23	T.
Doylestown	......	......	......	4.19	
Drifton	88	29	53.4	2.33	
East Mauch Chunk	91	26	54.4	2.49	
Easton	84	32	56.2	2.79	
Ellwood Junction	......	......	......	4.84	
Emporium	85	25	53.0	2.39	0.4
Ephrata	88	28	55.4	2.40	
Everett	87	27	55.8	3.64	
Forks of Neshaminy	......	......	......	4.19	
Franklin	84	22	52.4	4.59	T.
Freeport	89	27	56.2	3.44	
George School	86	30	54.6	4.70	
Gettysburg	89	29	57.2	3.85	
Girardville	......	......	......	1.91	
Gordon	86	23	53.6	2.55	
Greensboro	......	......	......	3.61	
Greenville	83	25	52.2	3.81	0.5
Grove City	80	21	52.6	2.76	T.
Hamburg	88	29	56.6	4.53	
Hanover	91	31	59.2	2.51	
Huntingdon	88	27	55.0	2.44	
Hyndman	89	27	56.5	4.13	
Indiana	84	26	55.2	3.38	T.
Irwin	85	26	56.9	3.31	T.
Johnstown	90	29	57.3	2.64	
Kennett	82	32	56.5	6.17	
Lansdale	......	......	......	2.93	
Lawrenceville	90	22	52.5	2.56	2.0
Lebanon	87	30	56.7	2.34	
Leroy	88	26	51.2	1.85	1.0
Lewisburg	90	28	55.5	2.69	
Lockhaven	90	28	56.6	2.10	
Lock No. 4	......	......	......	3.30	
Lycippus	83	30	56.3	3.27	T.
Marion	89	29	57.4	4.33	
Mauch Chunk	......	......	......	2.49	
Mifflintown	89	28	55.0	2.19	
Milford	90	24	52.4	3.06	T.
Montrose	85	19	50.6	2.88	1.0
New Germantown	86	28	55.3	2.55	
Ottsville	......	......	......	2.80	
Parker	......	......	......	2.95	
Philadelphia	84	38	58.2	6.37	
Pocono Lake	83	22	48.8	2.09	
Point Pleasant	......	......	......	3.25	
Pottsville	......	......	......	2.15	
Reading	87	36	57.4	1.95	
Renovo	......	......	......	2.46	
Saegerstown	83	23	50.9	3.75	0.2
St. Marys	82	24	51.8	2.20	T.
Saltsburg	......	......	......	2.08	
Seisholtzville	......	......	......	2.55	
Selinsgrove	88	28	56.3	3.30	
Shawmont	......	......	......	4.33	
Skidmore	84	25	52.3	2.14	
Smiths Corners	......	......	......	2.33	
Somerset	87	25	53.5	5.00	
South Eaton	86	25	53.2	2.27	
Springdale	......	......	......	2.76	
Springmount	......	......	......	2.49	
State College	85	29	53.9	3.14	T.
Towanda	86	24	52.1	1.92	0.4
Pennsylvania—Cont'd.	°	°	°	*Ins.*	*Ins.*
Uniontown	85	31	57.0	3.64	T.
Warren	85	24	51.8	4.78	0.4
Wellsboro	87	21	51.2	2.15	T.
Westchester	85	33	56.3	4.93	
West Newton	......	......	......	2.85	
Whitehaven	85[d]	25[d]	52.0[d]	2.07	
Wilkesbarre	86	29	55.1	1.58	
Williamsport	86	31	55.8	2.02	
Rhode Island.					
Bristol	70	36	51.2	4.14	
Kingston	85	29	49.8	5.64	
Providence	......	......	......	3.92	
South Carolina.					
Aiken	91	51	71.5	3.57	
Allendale	89	53	71.8	6.50	
Anderson	90	46	68.6	3.49	
Barksdale	90	45	69.4	1.98	
Batesburg	90	48	70.5	6.82	
Beaufort	88	55	72.4	3.72	
Bennettsville	92	44	70.2	4.38	
Blackville	95	50	73.0	5.67	
Bowman	92	52	72.0	8.97	
Calhoun Falls	......	......	......	3.57	
Camden	90	48	69.2	6.16	
Catawba	......	......	......	2.52	
Chappells	......	......	......	2.24	
Cheraw	89	45	68.4	5.11	
Clarks Hill	88	48	69.3	2.76	
Clemson College	84	45	67.2	4.29	
Conway	91	48	70.8	4.14	
Darlington	95	44	70.7	4.79	
Dillon	91	41	69.4	3.21	
Due West	88	48	69.4	4.54	
Edisto	......	......	......	7.26	
Effingham	......	......	......	5.55	
Florence	93	45	70.6	3.38	
Georgetown	89	52	72.4	3.54	
Greenville	85	43	64.2	4.32	
Greenwood	90	48	68.8	2.35	
Heath Springs	92	54	70.7	5.27	
Kingstree	90	56	73.1	2.58	
Liberty	90	45	68.2	6.11	
Little Mountain	96	49	70.0	3.68	
Newberry	91	49	70.3	6.38	
Pelzer	......	......	......	4.50	
St. George	89	56	73.6	5.23	
St. Matthews	88	50	69.8	5.44	
St. Stephens	......	......	......	3.01	
Saluda	91	47	70.2	3.24	
Santuck	92	45	68.2	3.28	
Smiths Mills	......	......	......	3.73	
Society Hill	88	46	69.2	5.19	
Spartanburg	90	43	67.6	4.12	
Stateburg	90	51	70.6	5.40	
Summerville	92	48	71.9	2.85	
Trenton	89[e]	48[e]	71.0[e]	5.14	
Trial	91	45	71.0	7.06	
Walhalla	90	42	66.8	4.53	
Walterboro	91	49	72.2	4.21	
Winnsboro	91	51	69.2	6.55	
Winthrop College	90	45	68.8	4.39	
Yemassee	89	51	70.5	4.70	
Yorkville	93	47	69.7	6.12	
South Dakota.					
Aberdeen	80	17	46.6	3.89	12.0
Academy	88	23	52.2	2.91	1.0
Alexandria	88	16	51.0	2.83	......
Armour	84	27	50.9	2.67	1.0
Bowdle	74	19	46.9	3.98	17.0
Brookings	86	18	47.8	2.36	10.9
Canton	92	22	51.0	2.16	......
Castlewood	80	16	46.2	2.05	8.8
Centerville	93	25	51.1	3.43	1.1
Chamberlain	88	24	52.5	3.07	1.0
Cherry Creek	85	20[e]	51.5[b]	3.10	......
Clark	84	16	48.4	3.02	5.5
Clear Lake	78	17	45.6	2.26	8.1
Desmet	83	20	48.0	3.30	4.5
Elkpoint	......	......	......	1.23	2.6
Fairfax	90	19	53.4	2.49	4.0
Farmingdale	......	......	......	6.74	0.5
Faulkton	80	18	47.4	4.27	4.0
Flandreau	90	20	47.2	2.40	8.0
Forestburg	87	19	48.4	4.16	T.
Fort Meade	86	22	47.4	10.95	4.5
Frederick	78	13	47.2	3.17	6.5
Gannvalley	87	21	50.5	3.10	1.0
Greenwood	89	26	54.2	2.01	1.5
Gregory	......	......	......	5.55	T.
Hermoso	85[e]	24[e]	49.4[e]	7.15	......
Highmore	82	19	49.9	5.11	2.0
Howard	84	20	49.0	1.78	3.0
Howell	84	15	48.0	5.23	5.0
Ipswich	78	17	46.6	6.01	11.5
Kenebec	85	20	48.2	3.03	4.5
Kidder	77	14	46.0	1.73	2.2
Kimball	85	22	49.8	2.72	......
La Delle	78[i]	16[i]	46.6[i]	4.03	5.5
South Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Little Eagle	76	20	47.8	2.63	6.3
Marion	92	26	52.3	2.92	1.0
Mellette	80	18	48.4	4.17	7.3
Menno	92	25	51.8	2.32	2.5
Mitchell	86	24	49.8	2.21	......
Mound City	75[d]	18[e]	45.4[d]	3.01	9.0
Oelrichs	88	19	49.5	5.95	T.
Orman	78	24	47.8	7.00	6.5
Plankinton	85[e]	22[e]	52.4[e]	2.08	......
Ramsey	90	24	48.4	3.15	4.5
Redfield	80	19	46.6	4.36	4.0
Roslyn	73	18	45.6	1.82	5.6
Sioux Falls	93	23	51.1	2.52	......
Spearfish	78[k]	22[k]	47.3[k]	9.39	2.0
Stephan	83	16	48.3	4.49	2.7
Vermillion	85	22	53.7	2.00	T.
Warnecke	......	......	......	4.54	......
Watertown	77	16	44.8	2.71	6.0
Wentworth	88	22	47.6	2.71	5.1
Wessington Springs	......	......	......	5.53	......
Whitehorse	77	22	49.2	3.76	4.1
Woolsey	......	......	......	4.48	4.5
Tennessee.					
Arlington	87	39	62.6	6.43	
Ashwood	87	35	62.5	6.62	
Benton	87	40	65.9	5.51	
Birds Bridge	......	......	......	2.80	
Bluff City	......	......	......	2.61	
Bolivar	90	40	63.1	8.53	
Brownsville	86	41	62.3	8.74	
Byrdstown	87	38	63.2	6.94	
Carthage	89	38	64.0	8.17	
Cedar Hill	91	36	64.6	8.95	
Celina	......	......	......	6.97	
Charleston	......	......	......	5.73	
Clarksville	86	37	63.0	7.07	
Clinton	......	......	......	3.45	
Covington	90	41	64.8	8.83	
Dandridge	......	......	......	2.52	
Dickson	92	34	63.9	10.56	
Dover	92	33	63.1	4.51	
Dyersburg	89	37	63.3	10.43	
Elizabethton	83	40	61.2	1.52	
Erasmus	87	33	60.0	4.40	
Florence	84	35	63.1	5.90	
Franklin	89	36	62.8	8.02	
Halls Hill	......	......	......	6.64	
Harriman	86	38	64.0	2.17	
Hohenwald	......	......	......	7.63	
Iron City	87	36	62.8	7.00	
Jackson	89[e]	39	65.4[b]	7.63	
Johnsonville	91	34	63.5	8.23	
Jonesboro	......	......	......	1.60	
Kenton	90	40	63.8	10.19	
Kingston	......	......	......	3.70	
Lafayette	87	34	62.2	7.23	
Lewisburg	90	35	63.0	5.83	
Loudon	......	......	......	3.20	
Lynnville	85[d]	40[d]	62.6[d]	3.97	
McGee	......	......	......	4.14	
McMinnville	88	37	63.2	4.63	
Maryville	89	39	64.9	3.70	
Milan	88	40	61.9	8.42	
Newport	84[e]	33[e]	64.0[e]	3.35	
Palmetto	89	36	63.3	5.48	
Pinewood	89[e]	34[e]	61.8[e]	9.30	
Pope	91	36	64.6	7.10	
Rogersville	87	35	63.8	3.04	
Rugby	87	30	61.4	5.62	
Savannah	86	40	65.0	8.78	
Sevierville	89	34	64.5	3.39	
Sewanee	84	39	61.1	5.90	
Silver Lake	81	32	59.3	3.78	
Sparta	88	37	63.6	3.63	
Springville	89	34	62.8	9.37	
Tazewell	......	......	......	4.55	
Tellico Plains	88	40	66.0	5.31	
Tracy City	80	38	61.0	5.09	
Trenton	88	37	63.1	7.79	
Tullahoma	90	37	63.3	6.13	
Union City	88	37	63.4	9.83	
Walling	......	......	......	5.18	
Waynesboro	88	36	62.6	8.73	
Wildersville	83	40	62.5	9.91	
Yukon	89	40	63.6	6.75	
Texas.					
Alvin	......	......	......	11.71	
Arthur	......	......	......	14.14	
Austin	86	42	67.1	6.46	
Ballinger	102	40	70.4	2.04	
Barstow	92	43	70.8	T.	
Beaumont	......	......	......	19.40	
Beeville	92	46	73.6	3.08	
Blanco	90	39	67.0	5.81	
Boerne	90	42	68.0	7.75	
Bonham	91	38	65.5	8.07	
Booth	......	......	......	17.50	
Bowie	92	36	65.9	4.97	

TABLE II.—*Climatological record of cooperative observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Brazoria	87	48	74.0	8.70	
Brenham	90	44	69.9	11.33	
Brighton	90	54	74.2	2.12	
Brownwood	95	37	67.9	3.24	
Canadian	90	28	61.2	1.12	
Channing	93	27	61.8	0.79	
Childress	94	27	64.2	1.80	
Chillicothe				7.81	
Clarksville	91	42	67.4	11.09	
Claredon				1.98	
Claude				3.40	
Claytonville	94	34	65.8	1.74	
Coleman	92	38	67.2	2.45	
College	86	43	66.6	6.50	
Colorado	96	27	67.7	2.10	
Corsicana	89	39	68.6	8.79	
Crockett	91	45	70.4	13.64	
Cross Bar Ranch				0.06	
Cuero	93	44	72.6	7.31	
Dallas	90	40	65.8	6.71	
Dalhart	90	30	61.8	1.11	
Danevang	91	48	73.8	8.05	
Decatur	98	30	64.4	6.73	
Denison				3.91	
Dialville	88	44	69.1	6.37	
Dublin	89	38	66.6	5.04	
Duval	87	42	68.7	8.34	
Eagle Pass	107	50	76.4	2.66	
Falfurrias	101	48	77.3	2.58	
Fort Clark	99	42	72.1	2.35	
Fort McIntosh	104	46	77.7	3.12	
Fredericksburg	90	41	67.8	7.19	
Gatesville	89	40	68.0	4.06	
Georgetown	90	41	69.0	9.15	
Gonzales				7.13	
Graham	93	38	66.9	6.29	
Grapevine	91	40	66.6	5.80	
Greenville	99	40	66.4	8.00	
Hallettsville	90	45	73.0	5.78	
Haskell	97	34	66.6	4.54	
Hemstead				10.98	
Henrietta	94	36	65.2	6.61	
Hewett				10.46	
Hillsboro	89	41	68.4	8.94	
Hondo	91	49	73.1	8.20	
Houston	94	50	72.2	15.87	
Hubbard	89	42	67.6	8.22	
Huntsville	92	45	69.8	13.28	
Jewett	87	42	68.4	10.00	
Kaufmann	89	42	68.4	9.62	
Keene	90	39	67.2	8.35	
Kerrville	93	44	70.0	8.15	
Knickerbocker	97	38	70.6	0.79	
Kopperl				8.87	
Lampasas	95	40	67.5	5.98	
Lapara				1.66	
Laureles Ranch				1.43	
Liberty	89	50	72.9	18.10	
Llano	97	42	70.4	3.40	
Lone Star Ranch				1.73	
Longview	90	39	68.5	7.59	
Lufkin	92	45	70.3	12.48	
Luling	90	43	71.0	9.62	
McLean	89	26	59.6	1.14	
Memphis				2.55	
Mexia	88	41	66.8	9.32	
Miami	91	24	61.3	1.75	
Mount Blanco	90	29	62.4	2.18	
Nacogdoches	92	45	68.6	9.07	
Nazareth	89	27	65.5	2.13	
Orange				16.10	
Panter				6.41	
Paris	88	39	64.8	12.40	
Pierce				8.96	
Plemons	90	22	58.4	1.10	
Port Lavaca	89	48	74.3	5.44	
Quanah	97	33	65.6	4.56	
Rhineland	96	33	65.8	6.25	
Riverside				11.59	
Rockisland	90	45	70.4	6.94	
Rockland				15.48	
Rockport				3.65	
Runge				6.84	
Sabinal	94	42	73.4	6.02	
San Marcos	95	42	68.8	8.52	
San Saba	96	38	68.5	4.55	
Seymour	90	36	64.1	7.86	
Sherman	87	40	66.4	6.93	
Sulphur Springs	86	42	66.3	7.74	
Temple	89	39	66.8	9.36	
Texline				3.10	
Tilden				6.59	
Trinity	93	45	70.6	11.26	
Valley Junction				8.00	
Victoria	89	46	73.0	8.58	
Waco	92	42	69.8	8.44	
Waxahachie	93	38	66.4	12.16	
Weatherford	92	38	66.4	5.65	
Texas—Cont'd.					
Wharton	91	47	72.2	11.36	
Wichita Falls	95	36	65.9	5.62	
Willis	94	47	71.8	6.41	
Willspoint	85	42	66.4	10.27	
Utah.					
Alpine				4.30	
Annabella				2.70	14.0
Aneth	87	33	60.2	0.85	
Beaver	78[g]	32[g]	52.6[g]	3.01	
Blackrock	83	23	54.2	1.31	0.6
Castledale	88	25	52.8	1.03	
Castlerock				3.01	15.0
Cedar City	76	30	52.0	2.63	11.5
Corinne	90	29	55.7	1.82	
Coyoto	81[e]	40[e]	55.7[e]	1.05	
Deseret	82	22	53.4	2.20	
Emery	80	21	51.9	1.52	
Enterprise				1.52	1.0
Escalante	81	28	51.2	1.40	
Experiment Farm	91	36	62.6		
Farmington	84	30	55.0	3.02	
Fillmore	85	32	55.5	3.20	
Fort Duchesne	85	25	52.8	1.02	
Garrison	84	25	54.4	0.42	
Government Creek	81	27	51.6	1.60	1.0
Grantsville				1.71	
Grayson	83	24	51.6	1.42	
Heber	80	20	50.4	2.00	
Henefer	82	20	49.2	2.50	5.0
Hite	93	40	63.8	1.41	
Huntsville				1.75	
Ibapah				3.14	16.7
Kanab	82	21	49.0	2.30	
Kelton				3.00	
Levan	80	27	51.6	2.33	
Logan	76	32	51.8	2.80	
Manti	82	26	50.4	3.75	
Marion				4.28	13.0
Marysvale	81	21	50.0	2.27	0.5
Meadowville	74	25	46 9	2.82	0.4
Millville				2.78	
Minersville				3.61	4.0
Moab	90	30	60.2	1.40	
Mount Nebo	84	36	58.6	1.21	
Mount Pleasant	84	28	51.2	2.88	
Nephi				2.13	
Oak City	83	28	54.8	1.69	
Ogden	86	36	57.2	1.89	
Park City	77	22	45.4	2.20	20.5
Parowan	82	28	52.0	2.85	11.2
Payson				2.19	
Pinto	75	15	47.2	1.84	.....
Plateau	76	16	45.6	3.59	17 2
Provo	85	28	55.0	2.80	
Ranch	73	21	45.5	2.58	
Randolph				2.37	.....
Richfield	90[f]	27[f]	55.6[f]	0.79	
St. George	97	38	64.2	0.44	.....
Saltair	82	36	57.0	2.29	
Scipio	83	20	51.6	1.80	
Snowville	82	21	50.2	0.92	
Soldier Summit	70	18	38.2	1.09	10.5
Sunnyside				1.45	2.2
Theodore	82	27	51.2	0.85	T.
Thistle	80	23	50.1	2.60	2.0
Tooele	81	31	54.3	1.23	
Trout Creek	85	29	53.8	0.79	
Vernal	89	31	56.1	1.37	
Wellington	90	21	54.5	0.36	
Woodruff	78	17	45.4	3.20	13.5
Vermont.					
Bloomfield	79	23	46.8	1.73	1.0
Cavendish	87[e]	23[e]	49.0[e]	3.06	1.0
Chelsea	72	22	45.2	2.53	2.0
Cornwall	78	28	50.8	0.83	0.1
Enosburg Falls	78	24	48.0	1.85	T.
Jacksonville	83	21	48.4	3.46	2.0
Manchester	81	25	49.3	3.17	1.0
Norwich	81	21	....	3.43	T.
St. Johnsbury	80	26	48.8	2.58	1.0
Wells	76	22	49.2	4.00	1.0
Woodstock	80	26	47.3	3.36	1.0
Virginia.					
Arvonia	92	32	62.8	3.25	
Ashland	87	37	61.6	4.99	
Bigstone Gap	84	35	61.8	4.32	
Blacksburg	85	30	56.6	2.70	
Buchanan				2.51	
Burkes Garden	77	24	55.4	3.80	
Callaville	89	35	63.0	5.65	
Cashville				2.11	
Charlottesville	88	38	61.6	3.26	
Clarksville				4.61	
Columbia	88	36	62.8	4.41	
Dale Enterprise	88	29	58.7	2.68	
Danville				1.30	
Dinwiddie	89	30	61.5	4.78	
Doswell	90	36	63.0	7.63	
Virginia—Cont'd.					
Elk Knob	82	35	61.4	3.96	
Fredericksburg	86	36	61.2	5.89	
Galax				1.27	
Grahams Forge	85	29	59.1	2.39	
Hampton	86	46	63.9	2.40	
Hot Springs	82	29	56.4	2.83	
Ivanhoe				2.03	
Lexington	89	33	58.8	3.77	
Lincoln	91	32	58.3	2.92	
Marion	81	32	58.8	3.39	
Mendota				3.49	
Milford	88	36	62.6	5.20	
Newport News	89	45	63.3	3.22	
Nokesville (near)	86	35	59.5	3.04	
Quantico	86	35	61.6	3.97	
Randolph				2.18	
Riverton				1.42	
Roanoke	90	38	64.0	3.28	
Rockymount	88	30	81.3	2.11	
Shenandoah				2.59	
Speers Ferry				4.63	
Spottsville	90	35	62.6	4.44	
Staunton	87	33	61.2	2.51	
Stephens City	89	29	59.2	2.84	
Warsaw	88	35	61.8	6.17	
Williamsburg	89	36	62.8	3.67	
Woodstock	88	33	60.4	2.17	
Washington.					
Aberdeen	85	33	52.6	2.70	
Anacortes	80	37	54.4	0.49	
Ashford				1.40	
Bellingham	79	34	55.8	0.70	
Bogachiel	92	32	57.4	4.43	
Cedar River				0.93	
Cedonia	72	34	51.0	2.95	
Centralia	91	32	57.6	0.80	
Cheney	91	22	58.6	2.05	
Clearbrook	85	28	54.6	0.86	
Clearwater	85	34	55.4	4.46	
Cle Elum	88	26	53.9	0.47	
Colfax	85	27	55.2	1.09	
Colville	85	27	54.9	2.44	
Conconully	82	32	56.4	1.88	
Coupeville	82	39	55.8	0.19	
Crescent	85	31	55.6	2.56	
Cusick	87	24	56.1	2.20	
Dayton	86	34	58.6	1.44	
East Sound	83	26	53.4	0.23	
Ellensburg	90	30	59.2	0.38	
Ephrata	92	34	63.2	0.80	
Fort Simcoe	86	37	60.9	0.46	
Goldendale	89	32	58.1	1.98	
Granite Falls				1.23	
Hatton	93	29	60.5	1.09	
Kiona	95	38	63.2	0.79	
Kosmos	93	34	58.1	0.93	
Lacenter	92	34	56.2	1.79	
Lakeside	87	41	61.8	0.49	
Lester	89[e]	27	54.8[e]	2.00	
Loomis				1.02	
Lucerne	82	41	58.8	2.00	
Mottinger Ranch	97	41	65.9	1.05	
Mount Pleasant	86	39	57.1	2.18	
Moxee	91	35	61.6	0.50	
Northport	84	23	53.5	1.98	
Odessa	90	30	57.6	1.79	
Olga	75	40	54.2	0.30	
Olympia	91	33	57.8	0.97	
Pinehill	92	35	59.6	0.56	
Pomeroy	88	31	57.8	1.06	
Port Townsend	79	40	55.6	0.27	
Pullman				0.90	
Quiniault	90	33	55.9	5.66	
Rex Creek	84[e]	42[f]	59.8[f]	0.98	
Rock Lake				1.57	
Rosalia	85	30	54.8	1.46	
Ruby Hill	81	30	54.2	2.00	
Sedro	85	33	56.5	0.63	
Sixprong	92	40	62.4	0.73	
Snohomish	79	35	55.2	0.85	
Snoqualmie	91	32	57.4	1.18	
Stehekin	83	36	57.8	0.54	
Stokes	84	33	56.0	1.37	
Touchet	96[e]	35[e]	63.2[e]	0.65	
Trinidad	95	45	67.4	0.20	
Twisp	89	32	58.0	0.94	
Union				3.06	
Vancouver	91	36	58.4	1.56	
Vashon	81	37	57.0	0.91	
Wahluke	94	40	64.7	0.63	
Waterville	85	25	55.6	0.90	
Wenatchee (near)	86	38	59.2	0.75	
Wilbur	85	28	56.0	2.07	
Yale	95	30	58.1	2.54	
Zindel	98[d]	40[d]	63.2[d]	1.01	
West Virginia.					
Bancroft	87	34	60.8	5.66	
Bayard	84	24	54.4	4.42	T.

TABLE II.—*Climatological record of cooperative observers*—Continued. *Late reports for April, 1907.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
West Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Beckley	85	29	57.2	3.13	
Bens Run	89	34	59.8	5.25	
Berkley Springs	90	30	58.9	4.27	
Burlington	87	27	57.8	3.56	
Cairo	91	30	61.2	4.47	
Central	88	29	57.7	3.28	
Charleston	90	31	63.1	3.66	
Creston	90	31	60.8	3.86	
Cuba	86	30	58.8	2.23	
Davis	.....	.....	.....	4.85	
Elkhorn	87	33	95.2	4.56	
Fairmont	90	28	59.1	5.84	
Franklin	87	29	58.4	2.17	
Glenville	91	32	62.0	4.26	
Grafton	85	30	58.4	5.12	
Green Sulphur Springs	87	31	55.6	2.55	
Harpers Ferry	.....	.....	.....	3.20	
Hinton	85	36	61.2	2.30	
Huntington	89	34	61.6	4.96	
Leonard	79	32	56.7	2.05	T.
Lewisburg	84	30	58.4	2.66	
Logan	90[d]	36[d]	65.4[d]	4.71	
Lost City	80	32	57.5	3.25	
Lost Creek	86	30	58.0	4.87	
Madison	88	35	58.3	6.33	
Mannington	89	29	58.8	4.99	
Martinton	88	28	57.6	.....	
Martinsburg	88	32	57.2	3.75	
Moorefield	90	27	59.5	2.91	
Mooresville	.....	.....	.....	2.51	
Morgantown	83	30	57.6	4.06	
Moundsville	88	31	59.2	4.28	
New Cumberland	85	27	54.8	2.50	
New Martinsville	87	32	59.6	5.26	
Nuttallburg	.....	.....	.....	1.38	
Oceana	92	33	62.6	5.18	
Parsons	87	26	56.0	4.75	
Philippi	85	29	58.2	4.76	
Pickens	84	28	54.7	3.84	
Point Pleasant	89	34	62.2	4.24	
Powellton	89	34	63.4	2.73	
Princeton	81	30	59.0	2.80	
Romney	92	30	59.7	3.71	
Rowlesburg	.....	.....	.....	5.54	
Ryan	88	30	60.0	4.63	
Smithfield	.....	.....	.....	2.46	
Spencer	89	30	57.2	4.44	
Sutton	93	32	62.2	3.79	
Terra Alta	82	27	53.8	6.37	
Union	82	27	57.0	1.67	
Uppertract	89	26	58.7	2.57	
Wellsburg	86	31	55.4	3.42	T.
Weston	90	30	58.8	4.67	
Wheeling	.....	.....	.....	4.29	
Williamson	89	36	63.4	4.07	
Woodbine	.....	.....	.....	2.80	
Wisconsin.					
Amherst	82	20	49.4	3.40	
Antigo	85	18	46.2	.....	
Appleton	79	26	49.2	3.46	0.5
Appleton Marsh	81	18	47.2	3.48	T.
Ashland	66	21	42.6	3.57	.....
Barron	82	18	44.8	1.83	5.0
Beloit	80	27	51.3	3.73	1.0
Brodhead	84	24	52.2	2.64	T.
Butternut	76	14	44.2	2.14	4.0
Cecil	84	21	47.8	2.39	1.0
Chilton	80	23	49.4	2.67	0.5
City Point	.....	.....	.....	3.23	T.
Cranden	73	16	44.4	1.93	3.5
Downing	83	17	47.2	1.70	T.
Eau Claire	85	20	49.8	3.27	0.5
Florence	68	16	42.8	1.92	1.8
Fond du Lac	84	23	50.6	2.22	1.0
Grand Rapids	81	22	49.4	2.24	0.2
Grand River Locks	.....	.....	.....	2.84	T.
Grantsburg	83	15	44.8	2.15	5.5
Hancock	82	21	49.0	2.89	T.
Hayward	77	11	43.4	2.14	0.5
Herbster	67	17	39.8	3.17	T.
Hillsboro	81	19	48.0	2.38	0.5
Koepenick	83	13	47.0	1.50	4.0
Lake Mills	82	24	50.0	4.02	T.
Lancaster	80	25	51.6	2.15	
Manitowoc	81	26	45.6	2.48	0.2
Mauston	80	20	49.8	2.64	
Meadow Valley	84	17	48.4	3.35	T.
Medford	80	19	47.8	2.60	1.0
Menasha	.....	.....	.....	3.08	1.5
Merrill	75	18	47.3	1.60	T.
Minocqua	74	16	44.0	0.78	6.5
Mount Horeb	80	22	49.2	3.67	1.0
Neillsville	84	22	48.6	2.81	.....
New Richmond	84	20	47.7	1.39	5.0
Oconto	81	22	47.4	2.22	0.5
Osceola	84	16	46.0	0.66	3.0
Oshkosh	82	25	49.4	2.83	T.
Pine River	82	22	48.8	2.42	0.1
Wisconsin—Cont'd.	°	°	°	*Ins.*	*Ins.*
Portage	82	26	50.8	3.35	T.
Port Washington	85	26	47.1	3.09	0.5
Prairie du Chien	86	24	51.8	1.65	T.
Prentice	75	15	44.0	3.08	3.2
Racine	84	29	49.2	4.29	T.
Sheboygan	83	29	47.0	2.91	0.5
Shullsburg	80	20	49.9	2.97	T.
Solon Springs	75	17	43.4	3.64	2.0
Spooner	79	13	44.6	2.05	4.0
Stanley	81	17	47.2	2.08	2.5
Stevens Point	83	18	48.4	2.59	.....
Sturgeon Bay	67	20	43.6	2.54	4.0
Valley Junction	84	19	48.7	3.29	T.
Viroqua	81	23	50.0	2.22	0.5
Watertown	83	22	50.0	3.02	T.
Waukesha	.....	.....	.....	3.22	0.3
Waupaca	86[f]	20[f]	49.8[f]	3.08	2.2
Wausau	82	20	47.8	1.84	1.2
Weyerhauser	81	14	45.5	2.30	4.5
Whitehall	91	17	51.2	3.00	
Wyoming.					
Barnum	.....	.....	.....	2.98	9.0
Basin	82	25	52.5	1.47	
Bedford	74	21	45.0	1.39	
Blue Cap	69	4	37.2	9.40	87.0
Border	76	21	45.9	1.29	.....
Buffalo	77	20	46.0	3.79	4.5
Camp Colter	76	20	48.5	1.20	2.0
Chugwater	81	13	46.2	3.42	5.0
Clark	74	27	49.6	1.96	4.5
Clear Creek Cabin	68	8	38.0	4.04	33.0
Dubois	72	21	45.4	1.85	
Etons Ranch	72	20	46.4	4.53	5.0
Elk Mountain	.....	.....	.....	2.17	24.5
Evanston	74	20	44.0	2.71	10.0
Experiment Farm	.....	.....	.....	1.78	4.5
Fayette	72	20	42.8	1.55	
Fort Laramie	89	16	50.0	2.53	
Granite Canyon	74	12	41.4	2.60	6.4
Granite Springs	75	11	44.1	2.52	11.0
Green River	82	21	47.1	0.48	1.0
Griggs	81	17	47.4	4.15	5.9
Hatton	.....	.....	.....	5.91	41.0
Hyattville	85	21	50.8		4.0
Jackson	73	18	45.2	1.74	
Kirtley	79	16	44.8	3.77	8.0
Laramie	73	7	42.0	1.09	0.5
Leo	76	12	43.0	1.32	1.5
Lusk	80	14	46.4	2.93	4.0
Moorcroft	87	21	47.5	2.70	3.0
Moore	80	15	46.2	1.88	11.4
New Castle	82	21	48.3	4.20	3.0
Pathfinder	82	18	48.5	1.58	1.0
Phillips	80	10	46.4	3.95	.....
Pine Bluff	85	7	48.2	2.12	5.0
Pinedale	78	9	43.0	0.83	2.0
Rawlins	73	13	44.6	0.78	
Riverton	81	19	50.4	1.32	.....
Saratoga	76	10	43.5	2.01	5.5
Sheridan	78	20	47.8	3.40	
Shoshone Canyon	73	26	47.6	1.59	0.3
South Pass City	65	8	36.7	.....	
Ten Sleep	87	21	51.8	1.93	
Wells	65	10	39.0	1.01	1.0
Wyncote	85	20	53.8	3.10	
Yellowstone Pk. (G. Can.)	61	13	37.6	1.46	6.0
Yellowstone Pk. (Lake)	60	10	37.3	1.66	7.0
Yellowstone Pk. (Norris)	68	15	39.4	0.59	
Yellowstone Pk. (Riv'side)	67	9	39.4	2.01	2.0
Yellowstone Pk. (S. River)	.....	.....	.....	0.94	.....
Yellowstone Pk. (Soda B.)	69	11	40.2	2.85	2.0
Yellowstone Pk. (T. Sta.)	64	13	39.0	0.61	5.0
Yellowstone Pk. (Up. Ba.)	64	11	38.6	0.61	3.0
Porto Rico.					
Adjuntas	84	58	70.7	13.81	
Aguirre	94	63	79.8	3.85	
Aibonito	88	53	72.6	5.90	
Anasco	92	61	77.7	9.75	
Arecibo	88	54	72.8	10.27	
Barros	88	60	73.4	10.19	
Bayamon	89	61	75.4	6.70	
Caguas	92	58	76.4	8.93	
Canovanas	91	67	78.6	7.07	
Cayey	89	52	72.6	3.97	
Cidra	89	59	74.8	7.71	
Corozal	91	61	78.2	7.23	
Fajardo	90	70	79.8	5.27	
Guanica	93	61	77.2	6.20	
Guayama	.....	.....	.....	5.11	
Hacienda Colosa	90	60	76.2	13.64	
Humacao	89	67	77.2	6.97	
Isabela	90	67	78.0	4.87	
Isolina	89	58	72.8	12.78	
Juana Diaz	91	61	75.8	6.41	
La Carmelita	85	60	72.2	15.11	
Lares	91	57	74.3	16.24	
Manati	93	63	78.0	5.18	
Maricao	86	54	71.4	17.11	
Porto Rico—Cont'd.	°	°	°	*Ins.*	*Ins.*
Maunabo	90	70	80.3	7.54	
Mayaguez	91	61	76.1	8.42	
Ponce	90	65	78.4	3.17	
Rio Blanco	88	64	76.4	13.00	
Rio Piedras	.....	.....	.....	5.40	
San German	91[b]	61[g]	76.6[b]	12.06	
San Lorenzo	90	59	74.4	5.37	
San Salvador	85	59	71.4	15.54	
Santa Isabel	90[d]	65[d]	78.6[d]	3.59	
Vieques	.....	.....	.....	3.10	
Yabucoa	.....	.....	.....	6.81	
Yauco	90	61	77.0	8.98	
New Brunswick.					
St. John	63	30	44.5	2.66	5.3

Late reports for April, 1907.

Stations.	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Alaska.					
Circle City	64	—32	24.0	0.15	.....
Forhnam	63	24	38.6	7.76	.....
Fort Egbert	64	—32	30.4	0.25	0.8
Fort Gibbon	61	—18	30.8	0.00	
Fort Liscum	53	11	34.6	0.82	2.0
Katala	51	22	37.0	7.50	2.1
Kenai	53	5	35.0	0.04	T.
Ketchemstock	59	—40	24.5	T.	T.
North Fork	62	—44	24.2	T.	T.
St. Michael	50	—10	21.2	0.00	
Sunrise	55	10	35.2	1.41	2.0
Tyonok	56	14	36.5	0.24	2.0
Wood Island	61	9	37.8	0.61	.....
California.					
King City	90	42	61.7	0.00	
San Mateo	82	52	66.7	0.20	
Colorado.					
Alamoosa	73	10	42.2	0.73	6.5
Cheesman	74	11	42.7	2.20	14.2
Garnett	80	5	41.0	0.79	
Lake Moraine	58	2	33.5	3.75	57.0
Florida.					
De Land	89	35	69.6	.....	
Plant City	96	35	70.8	1.14	
Iowa.					
Stuart	75	19	42.4	1.33	1.0
Maryland.					
Oakland	77	10	40.4	3.21	8.5
Massachusetts.					
Groton	74	20	40.6	2.94	13.5
Hyannis	59	23	41.4	3.49	9.0
Minnesota.					
Two Harbors	54	12	32.6	1.50	10.0
Missouri.					
Birch Tree	82	28	50.7	4.40	
Sikestown	84	26	51.2	5.28	
Versailles	80	25	49.6	5.30	T.
Montana.					
Canyon Ferry	72	13	41.4	0.44	1.5
Chester	66	5	38.0	2.06	2.2
Evans	65	5	39.0	3.30	25.0
Fort Logan	66	3	38.4	0.60	6.0
Gold Butte	61	—10	30.0	1.49	11.2
Graham	.....	.....	.....	1.12	4.5
Hamilton	73	17	44.8	0.44	2.4
Nevada.					
Carlin	72	33	49.0	0.03	
Humboldt	75	32	45.6	0.00	
North Dakota.					
Flasher	80	9	36.0	0.40	4.0
Grafton	57	— 3	28.8	0.50	5.0
Moyersville	64[c]	— 1[d]	31.7[d]	0.35	4.0
Wahpeton	64	15	35.2	0.48	
Ohio.					
North Lewisburg	80	16	42.8	3.57	1.8
Oberlin	80	15	41.4	2.52	.....
Oklahoma.					
Alva	89	28	54.4	1.97	
McComb	86	27	55.7	3.59	
Oregon.					
Cascade Locks	77	32	50.7	9.53	
Dale	.....	.....	.....	1.99	.....
Sparta	72	24	45.6	0.53	5.0
South Dakota.					
Hermosa	79	14	39.6	1.24	5.4
Oelrichs	77	12	39.6	0.30	0.5
Texas.					
Claude	89	20	54.7	1.60	.....
West Virginia.					
Madison	90	22	40.8	4.80	4.0

CORRECTIONS.

March, 1907.

Louisiana, Ruston, make maximum 88[d], minimum 38[d], mean 67.4[d]. Oregon, Odell, make precipitation 3.78.

April, 1907.

Arkansas, Newport, make precipitation 7.82.

TABLE III.—*Wind resultants, from observations at 8 a. m. and 8 p. m., daily, during the month of May, 1907.*

Stations.	Component direction from— N.	S.	E.	W.	Resultant. Direction from—	Duration.
	Hours.	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
New England.						
Eastport, Me	19	21	13	24	s. 80 w.	11
Portland, Me	21	21	12	21	w.	9
Concord, N. H. †	12	9	11	10	n. 18 e.	3
Burlington, Vt. †	8	12	6	12	s. 56 w.	7
Northfield, Vt	27	25	4	18	n. 82 w.	14
Boston, Mass	18	19	18	23	s. 79 w.	5
Nantucket, Mass	18	20	15	24	s. 77 w.	9
Block Island, R. I	17	19	16	28	s. 81 w.	12
Providence, R. I	21	15	19	23	n. 34 w.	7
Hartford, Conn	27	25	6	18	n. 81 w.	12
New Haven, Conn	25	22	15	17	n. 34 w.	4
Middle Atlantic States.						
Albany, N. Y	25	25	4	19	w.	15
Binghamton, N. Y. †	11	5	8	12	n. 34 w.	7
New York, N. Y	20	21	19	17	s. 63 e.	2
Harrisburg, Pa	19	11	24	20	n. 27 e.	9
Philadelphia, Pa	21	19	19	16	n. 56 e.	4
Scranton, Pa	24	20	11	22	n. 70 w.	12
Atlantic City, N. J	19	22	19	19	s.	3
Cape May, N. J	20	23	20	12	s. 69 e.	8
Baltimore, Md	21	18	17	18	n. 18 w.	3
Washington, D. C	24	22	19	18	n. 27 e.	6
Lynchburg, Va	16	21	17	19	s. 22 w.	5
Mount Weather, Va	20	23	19	22	s. 45 w.	4
Norfolk, Va	18	28	20	10	s. 45 e.	14
Richmond, Va	20	25	25	4	s. 77 e.	22
Wytheville, Va	18	10	11	36	n. 72 w.	26
South Atlantic States.						
Asheville, N. C	21	23	20	14	n. 72 e.	6
Charlotte, N. C	17	24	17	15	s. 16 e.	7
Hatteras, N. C	22	23	16	18	s. 63 w.	2
Raleigh, N. C	20	23	15	17	s. 34 w.	4
Wilmington, N. C	13	26	21	19	s. 9 e.	13
Charleston, S. C	9	29	18	18	s.	20
Columbia, S. C	11	27	17	20	s. 11 w.	16
Augusta, Ga	10	29	21	17	s. 12 e.	19
Savannah, Ga	11	31	15	18	s. 9 w.	20
Jacksonville, Fla	15	24	28	12	s. 61 e.	18
Florida Peninsula.						
Jupiter, Fla	10	29	22	16	s. 18 e.	20
Key West, Fla	13	16	38	4	s. 85 e.	34
Tampa, Fla	19	16	27	16	n. 75 e.	11
Eastern Gulf States.						
Atlanta, Ga	13	18	20	25	s. 45 w.	7
Macon, Ga. †	9	10	9	10	s. 45 w.	1
Thomasville, Ga	13	23	21	18	s. 17 e.	10
Pensacola, Fla. †	13	10	8	7	n. 18 e.	3
Anniston, Ala	18	32	14	11	s. 78 e.	14
Birmingham, Ala	21	23	13	14	s. 27 w.	2
Mobile, Ala	22	25	21	8	s. 77 e.	13
Montgomery, Ala	21	16	22	18	n. 39 e.	6
Meridian, Miss	19	18	23	17	n. 80 e.	6
Vicksburg, Miss	15	26	24	12	s. 47 e.	16
New Orleans, La	17	32	21	5	s. 47 e.	22
Western Gulf States.						
Shreveport, La	15	25	30	10	s. 63 w.	22
Bentonville, Ark. †	13	10	8	5	n. 45 e.	4
Fort Smith, Ark	9	20	32	13	s. 60 e.	22
Little Rock, Ark	19	16	25	14	n. 75 e.	11
Corpus Christi, Tex	13	22	35	5	s. 73 e.	31
Fort Worth, Tex	18	23	22	12	s. 63 e.	11
Galveston, Tex	18	26	32	6	s. 63 e.	29
Palestine, Tex	16	23	24	8	s. 68 e.	18
San Antonio, Tex	24	15	36	2	n. 75 e.	35
Taylor, Tex. †	10	15	9	2	s. 54 e.	9
Ohio Valley and Tennessee.						
Chattanooga, Tenn	16	25	14	21	s. 38 w.	11
Knoxville, Tenn	19	22	10	29	s. 81 w.	19
Memphis, Tenn	16	24	26	10	s. 63 e.	18
Nashville, Tenn	18	22	17	16	s. 14 e.	4
Lexington, Ky. †	6	15	12	5	s. 38 e.	11
Louisville, Ky	19	24	15	16	s. 11 w.	5
Evansville, Ind. †	12	12	11	5	e.	6
Indianapolis, Ind	23	21	20	14	n. 72 e.	6
Cincinnati, Ohio	21	18	22	17	n. 50 e.	6
Columbus, Ohio	16	20	20	19	s. 14 e.	4
Pittsburg, Pa	29	13	10	27	n. 47 w.	23
Parkersburg, W. Va	21	21	9	22	w.	13
Elkins, W. Va	25	15	6	26	n. 27 w.	22
Lower Lake Region.						
Buffalo, N. Y	16	20	18	23	s. 51 w.	6
Canton, N. Y. †	8	7	7	17	n. 84 w.	10
Oswego, N. Y	21	13	9	28	n. 67 w.	21
Rochester, N. Y	18	15	14	30	n. 79 w.	16
Syracuse, N. Y	17	20	13	24	s. 75 w.	11
Erie, Pa	22	17	17	21	n. 39 w.	6
Cleveland, Ohio	24	20	20	14	n. 56 e.	7
Sandusky, Ohio †	9	8	10	10	n.	1
Toledo, Ohio	20	19	15	21	n. 80 w.	6
Detroit, Mich	19	15	17	24	n. 60 w.	8
Upper Lake Region.						
Alpena, Mich	24	18	19	14	n. 40 e.	8
Escanaba, Mich	27	19	21	9	n. 56 e.	14
Grand Haven, Mich	19	22	13	20	s. 67 w.	8
Grand Rapids, Mich	22	17	13	22	n. 61 w.	10
Houghton, Mich. †	7	4	14	11	n. 45 e.	4
Marquette, Mich	30	9	14	23	n. 23 w.	23
Port Huron, Mich	22	18	13	21	n. 63 w.	9
Sault Ste. Marie, Mich	19	13	17	29	n. 63 w.	13
Chicago, Ill	22	17	24	18	n. 50 e.	8
Milwaukee, Wis	25	20	15	16	n. 11 w.	5
Green Bay, Wis	21	20	23	18	n. 79 e.	5
Duluth, Minn	35	6	23	19	n. 8 e.	29
North Dakota.						
Moorhead, Minn	34	14	19	8	n. 29 e.	23
Bismarck, N. Dak	30	7	22	14	n. 19 e.	24
Devils Lake, N. Dak	31	14	16	12	n. 13 e.	18
Williston, N. Dak	34	10	16	12	n. 9 e.	24
Upper Mississippi Valley.						
Minneapolis, Minn. *	15	6	8	10	n. 13 w.	9
St. Paul, Minn	29	15	20	8	n. 41 e.	18
La Crosse, Wis. †	10	13	8	4	s. 53 e.	5
Madison, Wis	18	24	19	15	s. 34 e.	7
Charles City, Iowa	24	18	16	16	n.	6
Davenport, Iowa	18	19	22	18	s. 76 e.	4
Des Moines, Iowa	23	20	18	17	n. 18 e.	3
Dubuque, Iowa	19	22	15	17	s. 34 w.	4
Keokuk, Iowa	17	27	22	14	s. 39 e.	13
Cairo, Ill	17	25	22	8	s. 63 e.	16
La Salle, Ill. †	9	8	14	8	n. 80 e.	6
Peoria, Ill	18	26	23	14	s. 48 e.	12
Springfield, Ill	18	25	21	12	s. 52 e.	11
Hannibal, Mo. †	9	10	10	9	s. 45 e.	1
St. Louis, Mo	14	26	26	11	s. 51 e.	19
Missouri Valley.						
Columbia, Mo. *	10	12	13	5	s. 76 e.	8
Kansas City, Mo	21	24	22	11	s. 75 e.	11
Springfield, Mo	20	24	22	14	s. 63 e.	9
Iola, Kans. †	11	9	11	4	n. 74 e.	7
Topeka, Kans. *	10	13	9	2	s. 67 e.	8
Lincoln, Nebr	21	25	16	9	s. 60 e.	8
Omaha, Nebr	23	23	20	9	e.	11
Valentine, Nebr	26	13	19	13	n. 25 e.	14
Sioux City, Iowa †	13	12	9	5	n. 76 e.	4
Pierre, S. Dak	25	10	27	14	n. 41 e.	20
Huron, S. Dak	25	16	25	9	n. 61 e.	18
Yankton, S. Dak. †	10	9	11	9	n. 63 e.	2
Northern Slope.						
Havre, Mont	24	4	28	16	n. 31 e.	23
Miles City, Mont	30	17	24	8	n. 51 e.	21
Helena, Mont	22	14	10	32	n. 70 w.	23
Kalispell, Mont	24	13	9	29	n. 61 w.	23
Rapid City, S. Dak	26	11	14	29	n. 45 w.	21
Cheyenne, Wyo	31	17	12	15	n. 12 w.	14
Lander, Wyo	18	20	12	26	s. 82 w.	14
Sheridan	26	10	11	28	n. 47 w.	23
Yellowstone Park, Wyo	27	18	4	30	n. 71 w.	28
North Platte, Nebr	23	19	22	14	n. 63 e.	9
Middle Slope.						
Denver, Colo	30	21	9	16	n. 38 w.	11
Pueblo, Colo	27	14	18	20	n. 9 w.	13
Concordia, Kans	20	24	18	11	s. 60 e.	8
Dodge, Kans	19	21	23	14	s. 77 e.	9
Wichita, Kans	22	25	20	9	s. 75 e.	11
Oklahoma, Okla	24	26	13	6	s. 74 e.	7
Southern Slope.						
Abilene, Tex	22	25	17	8	s. 72 e.	10
Amarillo, Tex	16	25	24	12	s. 53 e.	15
Del Rio, Tex †	9	8	17	5	n. 85 e.	12
Roswell, N. Mex	20	21	11	20	s. 84 w.	9
Southern Plateau.						
El Paso, Tex	19	5	21	30	n. 33 w.	17
Santa Fe, N. Mex	16	20	27	16	s. 70 e.	12
Flagstaff, Ariz	22	20	8	31	n. 85 w.	23
Phoenix, Ariz	9	16	27	23	s. 30 e.	8
Yuma, Ariz	11	15	13	35	s. 80 w.	22
Independence, Cal	31	14	9	23	n. 39 w.	22
Middle Plateau.						
Reno, Nev	14	5	9	42	n. 75 w.	34
Tonopah, Nev	19	15	13	32	n. 78 w.	19
Winnemucca, Nev	23	16	15	26	n. 58 w.	13
Modena, Utah	17	13	10	34	n. 81 w.	24
Salt Lake City, Utah	23	21	24	12	n. 81 e.	12
Durango, Colo	29	8	6	35	n. 54 w.	36
Grand Junction, Colo	16	21	21	21	s.	5
Northern Plateau.						
Baker City, Oreg	23	27	10	14	s. 45 w.	6
Boise, Idaho	25	14	16	24	n. 36 w.	14
Lewiston, Idaho †	3	2	28	0	n. 88 e.	28
Pocatello, Idaho	13	24	19	24	s. 24 w.	12
Spokane, Wash	24	17	12	22	s. 55 w.	12
Walla Walla, Wash	8	34	10	17	s. 15 w.	27
North Pacific Coast Region.						
North Head, Wash	31	14	7	30	n. 54 w.	29
Port Crescent, Wash. *	12	3	0	25	n. 45 w.	35
Seattle, Wash	22	20	12	19	n. 74 w.	7
Tacoma, Wash	24	19	6	28	n. 85 w.	22
Tatoosh Island, Wash	3	27	9	37	s. 49 w.	37
Portland, Oreg	25	22	11	19	n. 69 w.	8
Roseburg, Oreg	31	14	10	22	n. 35 w.	21
Middle Pacific Coast Region.						
Eureka, Cal	26	19	7	25	n. 68 w.	18
Mount Tamalpais, Cal	28	6	0	45	n. 64 w.	50
Red Bluff, Cal	20	21	16	23	s. 82 w.	7
Sacramento, Cal	10	38	11	16	s. 10 w.	28
San Francisco, Cal	4	10	0	56	s. 84 w.	56
San Jose, Cal. †	21	0	0	23	n. 48 w.	31
Southeast Farallon, Cal. *	18	4	0	20	n. 55 w.	24
South Pacific Coast Region.						
Fresno, Cal	33	5	6	34	n. 45 w.	40
Los Angeles, Cal	12	17	18	30	s. 67 w.	13
San Diego, Cal	20	11	5	39	n. 75 w.	35
San Luis Obispo, Cal	25	8	3	34	n. 61 w.	35
West Indies						
San Juan, Porto Rico	2	11	53	2	s. 80 e.	52
Grand Turk, W. I. †	0	13	24	2	s. 60 e.	26

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.80 in 1 hour, during May, 1907, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
Abilene, Tex.	9	5:10 a.m.	8:45 a.m.	0.97	5:30 a.m.	5:50 a.m.	0.02	0.19	0.44	0.60	0.72										
Do	29	2:05 p.m.	4:05 p.m.	0.80	3:17 p.m.	3:40 p.m.	0.07	0.24	0.49	0.62	0.69	0.72									
Albany, N. Y.	27			0.36									0.29								
Alpena, Mich.	27			0.82														0.23			
Amarillo, Tex.	30			0.19														0.14			
Anniston, Ala.	6	12:55 p.m.	7:55 p.m.	0.87	1:02 p.m.	1:37 p.m.	0.01	0.14	0.23	0.36	0.48	0.52	0.53	0.58							
Do	14	5:45 p.m.	D. N.	2.57	6:02 p.m.	6:28 p.m.	0.05	0.26	0.57	0.77	0.87	0.92									
Asheville, N. C.	3			0.70														0.41			
Atlanta, Ga.	26			0.45						0.33											
Atlantic City, N. J.	27			0.44					0.35												
Augusta, Ga.	8-9	9:30 p.m.	6:20 a.m.	1.70	11:34 p.m.	11:59 p.m.	0.32	0.16	0.34	0.35	0.47	0.54									
Do	26	12:55 p.m.	2:45 p.m.	1.32	1:02 p.m.	2:07 p.m.	0.01	0.19	0.37	0.46	0.46	0.46	0.50	0.52	0.54	0.67	0.79	1.18	1.31		
Baltimore, Md.	6			0.54									0.33								
Bentonville, Ark.	5	5:10 p.m.	11:30 p.m.	2.10	6:14 p.m.	7:41 p.m.	0.15	0.06	0.11	0.17	0.23	0.31	0.39	0.46	0.52	0.58	0.59	0.64	1.08	1.33	
Binghamton, N. Y.	18			0.25						0.25											
Birmingham, Ala.	6	12:14 p.m.	2:50 p.m.	1.00	12:16 a.m.	12:56 p.m.	0.01	0.14	0.45	0.52	0.56	0.63	0.73	0.80	0.88						
Do	14-15	3:53 p.m.	1:30 a.m.	2.42	1:05 p.m.	10:55 p.m.	1.33	0.06	0.10	0.18	0.26	0.50	0.60	0.66	0.73	0.80	0.85				
Do	24	2:36 p.m.	7:45 p.m.	1.43	2:41 p.m.	3:21 p.m.	0.03	0.05	0.20	0.22	0.23	0.25	0.31	0.55	0.71						
Bismarck, N. Dak.	29			0.66														0.40			
Block Island, R. I.	27			1.15														0.44			
Boise, Idaho	19			0.04						0.03											
Boston, Mass.	11			0.96														0.26			
Buffalo, N. Y.	15			1.09														0.60			
Cairo, Ill.	14			0.62					0.31												
Canton, N. Y.	4			1.06														0.20			
Charles City, Iowa	14			0.34					0.32												
Charleston, S. C.	6	9:10 p.m.	D. N.	0.69	10:22 p.m.	10:52 p.m.	0.06	0.10	0.36	0.42	0.46	0.53	0.59								
Charlotte, N. C.	31			1.77														0.61			
Chattanooga, Tenn.	10	12:50 p.m.	11:40 p.m.	1.49	6:23 p.m.	6:53 p.m.	0.53	0.06	0.12	0.26	0.36	0.47	0.53								
Do	14-15	6:25 p.m.	2:05 a.m.	1.27	6:32 p.m.	6:52 p.m.	0.03	0.12	0.27	0.41	0.51										
Cheyenne, Wyo.	23			0.54														0.50			
Chicago, Ill.	26			0.50														0.39			
Cincinnati, Ohio	19			0.44					0.24												
Cleveland, Ohio	15			0.30					0.25												
Columbia, Mo.	13-14			2.23						0.41											
Columbia, S. C.	31	5:05 p.m.	10:50 p.m.	2.69	5:11 p.m.	6:21 p.m.	0.01	0.31	0.63	1.10	1.30	1.45	1.61	1.81	1.90	2.07	2.17	2.24	2.53		
Columbus, Ohio	25	2:45 p.m.	4:15 p.m.	0.54	3:12 p.m.	3:32 p.m.	0.02	0.06	0.25	0.36	0.48										
Concord, N. H.	16			1.03														0.37			
Corpus Christi, Tex.	20	10:41 a.m.	12:14 p.m.	0.70	10:52 a.m.	11:22 a.m.	0.02	0.16	0.25	0.37	0.43	0.56	0.56								
Do	31	3:44 p.m.	4:02 p.m.	0.57	3:50 p.m.	4:00 p.m.	0.01	0.25	0.55												
Davenport, Iowa	22-23	6:02 p.m.	5:00 a.m.	1.98	10:50 p.m.	11:09 p.m.	0.33	0.13	0.34												
Del Rio, Tex.	7	9:40 p.m.	10:15 p.m.	1.90	9:42 p.m.	10:12 p.m.	0.01	0.27	0.57	1.02	1.35	1.62	1.88								
Denver, Colo.	29-30			0.58														*			
Des Moines, Iowa	25			0.73														0.52			
Detroit, Mich.	26	11:45 a.m.	12:15 p.m.	0.39	11:53 a.m.	12:03 p.m.	T.	0.27	0.38												
Dodge, Kans.	2			1.23					0.30												
Dubuque, Iowa	13-14			0.78					0.35												
Duluth, Minn.	25			0.66														0.13			
Eastport, Me.	4			0.44														0.22			
Elkins, W. Va.	26			0.30				0.30													
Erie, Pa.	26			0.41						0.35											
Escanaba, Mich.	14			0.99														0.37			
Evansville, Ind.	†	9:45 p.m.	D. N.	1.35	10:57 p.m.	11:32 p.m.	0.19	0.10	0.25	0.46	0.68	0.90	0.99	1.05							
Fort Smith, Ark.	25	6:38 p.m.	9:20 p.m.	0.53	7:00 p.m.	7:20 p.m.	0.01	0.22	0.29	0.37	0.46										
Fort Worth, Tex.	7	11:48 a.m.	7:40 p.m.	1.24	12:45 p.m.	1:02 p.m.	0.04	0.14	0.42	0.59	0.62										
Do	24	1:23 p.m.	11:30 p.m.	1.75	6:30 p.m.	7:30 p.m.	0.29	0.08	0.13	0.31	0.63	0.70	0.74	0.76	0.81	0.97	1.09	1.38			
Do	29-34	8:01 p.m.	12:30 a.m.	1.00	8:06 p.m.	8:24 p.m.	0.03	0.19	0.32	0.49	0.53										
Galveston, Tex.	0	5:56 p.m.	7:04 p.m.	1.56	6:37 p.m.	6:57 p.m.	0.03	0.34	1.00	1.37	1.49										
Grand Haven, Mich.	26-29			0.86														0.80			
Grand Rapids, Mich.	26-27			1.08														0.45			
Green Bay, Wis.	25-27			1.11														*			
Hannibal, Mo.	16			1.04														0.38			
Harrisburg, Pa.	4			0.36														0.28			
Hartford, Conn.	16-14			0.98														0.25			
Hatteras, N. C.	7	5:40 a.m.	11:35 a.m.	1.19	9:31 a.m.	10:04 a.m.	0.46	0.09	0.27	0.37	0.44	0.49	0.54	0.58							
Huron, S. Dak.	29			1.30						0.44											
Indianapolis, Ind.	25			0.58						0.39											
Iola, Kans.	13-14	6:45 p.m.	5:10 a.m.	1.60	7:06 p.m.	7:[illegible]7 p.m.	0.01	0.07	0.17	0.28	0.37	0.49	0.50	0.52	0.66	0.72	0.84				
Jacksonville, Fla.	12	12:20 a.m.	4:30 a.m.	1.10	12:29 a.m.	1:[illegible]9 a.m.	0.02	0.33	0.47	0.53	0.56	0.60	0.62	0.65	0.71	0.83	0.94				
Do	31	7:15 p.m.	10:15 p.m.	1.40	8:25 p.m.	8:40 p.m.	0.48	0.10	0.38	0.83											
Jupiter, Fla.	12	7:35 a.m.	10:40 a.m.	1.12	7:42 a.m.	8:07 a.m.	0.02	0.13	0.49	0.70	0.82	0.87									
Kansas City, Mo.	30-31			0.78														0.34			
Keokuk	24	6:30 p.m.	11:25 p.m.	0.96	10:50 p.m.	11:13 p.m.	0.31	0.06	0.11	0.39	0.54	0.65									
Key West, Fla.	28	1:45 a.m.	4:00 a.m.	2.09	2:45 a.m.	3:45 a.m.	0.14	0.11	0.47	0.64	0.80	1.03	1.18	1.37	1.63	1.83	1.92				
Knoxville, Tenn.	6-7			1.14														0.39			
La Crosse, Wis.	21-22			1.36														0.50			
La Salle, Ill.	23-24			1.22														0.44			
Lexington, Ky.	10			0.54														0.36			
Lincoln, Nebr.	22-23			1.36														0.35			
Little Rock, Ark.	5-6	7:20 p.m.	6:40 a.m.	4.17	8:29 p.m.	10:14 p.m.	0.07	0.16	0.27	0.36	0.50	0.63	0.76	0.81	0.83	0.96	1.05	1.63	2.26	2.79	3.08
Do	24	4:50 p.m.	3:45 a.m.	1.42	6:41 p.m.	7:11 p.m.	0.07	0.15	0.21	0.39	0.53	0.61	0.66								
Los Angeles, Cal.	6			0.05														0.03			
Louisville, Ky.	†			1.62						0.44											
Lynchburg, Va.	15			0.41					0.34												
Macon, Ga.	3	2:56 p.m.	4:45 p.m.	1.10	3:23 p.m.	4:10 p.m.	0.01	0.28	0.46	0.49	0.57	0.71	0.78	0.85	0.94	1.03	1.06				
Do	30	4:35 p.m.	5:11 p.m.	0.76	4:35 p.m.	5:02 p.m.	T.	0.15	0.37	0.55	0.62	0.70	0.76								
Madison, Wis.	22			1.60														0.56			
Marquette, Mich.	14-15			0.75														*			
Memphis, Tenn.	5-6	3:45 p.m.	8:55 a.m.	3.24	6:25 a.m.	7:00 a.m.	2.19	0.12	0.15	0.27	0.37	0.60	0.74	0.83							
Meridian, Miss.	14	1:25 p.m.	10:00 p.m.	3.42	2:33 p.m.	3:04 p.m.	0.06	0.37	0.79	0.93	1.04	1.15	1.21	1.26							
Milwaukee, Wis.	22			1.29														0.32			
Minneapolis, Minn.	25			0.95														0.24			
Mobile, Ala.	1	12:45 p.m.	3:40 p.m.	0.82	2:24 p.m.	2:58 p.m.	0.12	0.13	0.27	0.36	0.42	0.49	0.54	0.59							
Montgomery, Ala.	10	3:20 p.m.	6:10 p.m.	1.23	5:17 p.m.	5:48 p.m.	0.19	0.09	0.37	0.59	0.75	0.88	0.99	1.01							
Do	14-15	5:45 p.m.	6:15 a.m.	1.88	11:12 p.m.	11:47 p.m.	0.65	0.15	0.24	0.40	0.55	0.62	0.68	0.73							
Do	23	2:50 p.m.	3:20 p.m.	0.63	2:51 p.m.	3:05 p.m.	0.01	0.10	0.48	0.60											
Mount Weather, Va.	8			0.70														0.25			
Nantucket, Mass.	27			1.08														0.62			
Nashville, Tenn.	14			0.99														0.62			
New Haven, Conn.	4			1.25														0.53			
New Orleans, La.	8	7:25 a.m.	11:25 a.m.	1.02	9:12 a.m.	9:41 a.m.	0.12	0.06	0.13	0.26	0.44	0.59	0.67								

TABLE IV.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
New Orleans, La	9	10:50 a. m.	3:45 p. m.	2.42	12:39 p. m.	1:51 p. m.	0.10	0.09	0.24	0.38	0.57	0.77	0.89	1.01	1.12	1.22	1.27	1.38	1.60		
Do	23	2:50 p. m.	4:53 p. m.	1.77	2:56 p. m.	3:43 p. m.	0.05	0.18	0.40	0.67	0.83	0.96	1.07	1.23	1.43	1.54					
Do	24	12:07 p. m.	2:15 p. m.	0.89	1:14 p. m.	1:37 p. m.	0.14	0.08	0.22	0.40	0.67	0.72									
Do	30-31	6:00 p. m.	D. N.	3.08	7:41 p. m.	8:03 p. m.	0.15	0.42	0.99	1.55	1.92										
					1:54 p. m.	2:08 a. m.	2.26	0.31	0.60	0.77											
New York, N. Y	16			1.06														0.47			
Norfolk, Va	27	5:25 p. m.	6:35 p. m.	0.60	5:39 p. m.	5:52 p. m.	0.01	0.17	0.47	0.56											
Northfield, Vt	4			0.78														0.27			
North Head, Wash	11			0.55														0.10			
Oklahoma, Okla	19	7:10 p. m.	8:30 p. m.	0.78	7:28 p. m.	7:53 p. m.	0.03	0.13	0.32	0.46	0.69	0.74									
Omaha, Nebr	24			0.31														0.29			
Palestine, Tex	31	12:01 p. m.	2:15 a. m.	0.84	12:26 a. m.	12:45 a. m.	0.07	0.21	0.39	0.52	0.59										
Parkersburg, W. Va	18			0.73														0.45			
Pensacola, Fla	14	9:45 p. m	11:25 p. m.	0.53	10:26 p. m.	10:45 p. m.	0.01	0.17	0.34	0.42	0.48										
Do	27	1:35 a. m	4:25 a. m.	0.79	2:03 a. m.	2:15 a. m.	0.01	0.22	0.45	0.53											
Peoria, Ill	14			0.86														0.40			
Philadelphia, Pa	16-17	12:05 p. m.	12:30 a. m.	1.84	1:36 p. m.	2:58 p. m.	0.20	0.15	0.25	0.40	0.48	0.49	0.52	0.67	0.73	0.76	0.79	0.90	1.20	1.29	
Pittsburg, Pa	23			0.37														0.21			
Portland, Me	16			0.78														0.30			
Portland, Oreg	10			0.66														0.12			
Pueblo, Colo	29			0.48														0.31			
Raleigh, N. C	16	1:32 p. m.	3:30 p. m.	0.56	1:35 p. m.	1:55 p. m.	0.01	0.17	0.33	0.39	0.44										
Richmond, Va	6-7	10:50 p. m.	D. N.	1.90	11:03 p. m.	11:45 p. m.	0.03	0.10	0.24	0.39	0.53	0.71	0.88	0.96	1.13	1.22					
Rochester, N. Y	15			0.63														0.34			
Sacramento, Cal	3			0.08														0.07			
St. Louis, Mo	30			2.00														0.69			
St. Paul, Minn	25			0.63														0.25			
Salt Lake City, Utah	23-24			1.58														0.31			
San Antonio, Tex	7-8	11:55 p. m.	2:15 a. m.	0.77	11:55 p. m.	12:10 a. m.	0.01	0.26	0.51	0.65											
Do	22	3:20 p. m.	4:35 p. m.	1.21	3:46 p. m.	4:16 p. m.	0.01	0.07	0.17	0.32	0.60	0.84	1.07								
Do	29-30	10:20 p. m.	5:58 a. m.	1.54	10:28 p. m.	10:49 p. m.	0.01	0.33	0.70	0.93	1.06										
San Diego, Cal	26			0.07						0.07											
Sandusky, Ohio	26			0.21					0.21												
San Francisco, Cal	10			0.01				0.01													
Savannah, Ga	31			0.60														0.39			
Scranton, Pa	16			0.23														0.09			
Seattle, Wash	19			0.14									0.12								
Shreveport, La	7	5:50 p. m.	D. N.	2.72	5:52 p. m.	7:17 p. m.	0.01	0.09	0.22	0.52	0.85	0.90	1.04	1.24	1.45	1.62	1.62	1.65	2.07	2.27	
Do	24-25	11:15 p. m.	6:15 a. m.	1.28	11:30 p. m.	12:00 mid.	0.08	0.09	0.27	0.50	0.55	0.62	0.68								
Spokane, Wash	19-20			1.69														0.77			
Springfield, Ill	14	11:05 a. m.	2:25 p. m.	0.87	11:47 a. m.	11:57 a. m.	0.03	0.49	0.67												
Springfield, Mo	14	11:15 a. m.	11:30 a. m.	1.40	5:48 a. m.	6:16 a. m.	0.54	0.08	0.18	0.28	0.38	0.56	0.62								
Do	23	1:50 p. m.	5:05 p. m.	0.81	1:56 p. m.	2:10 p. m.	0.01	0.16	0.40	0.45											
Syracuse, N. Y	16			0.38														0.21			
Tampa, Fla	†	8:50 p. m.	D. N.	1.34	8:53 p. m.	9:23 p. m.	0.01	0.24	0.48	0.60	0.69	0.78	0.85								
Taylor, Tex	9	6:00 a. m.	2:55 p. m.	1.28	1:10 p. m.	1:55 p. m.	0.05	0.07	0.23	0.44	0.69	0.88	0.95	0.96	0.98	1.06					
Do	29	D. N.	11:35 a. m.	1.55	7:00 a. m.	7:50 a. m.	0.08	0.05	0.14	0.20	0.30	0.51	0.72	0.90	1.02	1.11	1.16				
Thomasville, Ga	11	3:22 p. m.	6:05 p. m.	1.25	3:25 p. m.	3:50 p. m.	0.01	0.33	0.52	0.64	0.78	0.89									
Toledo, Ohio	26	1:07 p. m.	1:35 p. m.	0.69	1:16 p. m.	1:26 p. m.	0.02	0.50	0.65												
Topeka, Kans	6			0.24														0.15			
Valentine, Nebr	24			0.68														0.30			
Vicksburg, Miss	5	12:50 p. m.	3:45 p. m.	1.40	2:46 p. m.	3:14 p. m.	0.10	0.06	0.18	0.40	0.70	1.10	1.17								
Washington, D. C	6	12:25 p. m.	4:20 p. m.	0.52	3:35 p. m.	3:50 p. m.	0.11	0.14	0.29	0.35											
Do	27	12:00 noon.	12:56 p. m.	0.37	12:27 p. m.	12:37 p. m.	T.	0.21	0.35												
Wichita, Kans	3			0.66														0.38			
Wilmington, N. C	11	5:25 a. m.	7:10 a. m.	0.79	5:30 a. m.	6:00 a. m.	0.01	0.08	0.28	0.30	0.31	0.41	0.53								
Wytheville, Va	6	1:45 p. m.	2:05 p. m.	0.57	1:59 p. m.	2:09 p. m.	0.04	0.21	0.52												
Do	6	3:40 p. m.	6:45 p. m.	0.65	6:05 p. m.	6:25 p. m.	0.12	0.11	0.28	0.39	0.50										
Yankton, S. Dak	12-13	6:20 p. m.	D. N.	1.04	7:50 p. m.	7:58 p. m.	0.30	0.23	0.35												
San Juan, Porto Rico	20	12:02 p. m.	2:30 p. m.	1.48	1:00 p. m.	1:36 p. m.	0.12	0.18	0.41	0.67	0.80	1.06	1.23	1.31							

* Self-register not working † May 31 to June 1.

TABLE V.—*Data furnished by the Canadian Meteorological Service, May, 1907.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Total snowfall.
	Ins.	Ins.	Ins.	°	°	°	°	Ins.	Ins.	Ins
St. Johns, N. F	29.70	29.84	−.14	40.7	− 2.2	48.1	33.3	3.33	−0.33	T.
Sydney, C. B. I	29.92	29.94	−.03	42.0	− 3.2	51.7	32.4	3.42	−0.35	0.0
Halifax, N. S	29.84	29.95	−.03	46.6	− 1.8	56.0	37.2	3.34	−0.92	0.2
Grand Manan, N. B	29.87	29.92	−.05	46.0	− 1.9	53.5	38.4	2.77	−0.84	0.0
Yarmouth, N. S	29.88	29.95	−.03	44.7	− 2.9	51.5	37.8	2.20	−1.60	0.0
Charlottetown, P. E. I	29.88	29.92	−.04	44.3	− 2.6	52.0	36.6	3.14	+0.23	7.5
Chatham, N. B	29.88	29.90	−.05	46.5	− 2.0	56.5	36.5	3.60	+0.39	1.5
Father Point, Que	29.90	29.92	−.01	42.1	− 1.9	48.8	35.4	3.03	+0.45	3.0
Quebec, Que	29.62	29.94	.00	45.1	− 4.8	52.9	37.3	2.94	−0.14	3.7
Montreal, Que	29.73	29.94	.00	48.2	− 6.5	56.5	39.9	1.93	−1.02	T.
Rockliffe, Ont	29.36	29.98	+.05	43.7	− 8.6	55.4	32.0	2.73	+0.22	2.2
Ottawa, Ont										
Kingston, Ont	29.68	29.99	+.03	46.3	− 6.6	54.3	38.2	1.71	−0.97	5.0
Toronto, Ont	29.61	29.99	+.01	48.3	− 4.9	58.6	38.0	1.93	−1.11	1.6
White River, Ont	28.62	29.96	+.01	34.3	−11.4	46.1	22.5	3.41	+1.46	18.6
Port Stanley, Ont	29.36	30.00	+.03	47.2	− 5.9	56.5	37.9	2.22	−0.96	1.4
Saugeen, Ont	29.29	30.01	+.05	44.8	− 5.9	54.2	35.5	1.87	−0.57	3.6
Parry Sound, Ont	29.29	29.99	+.04	45.2	− 5.9	56.0	34.4	1.48	−1.45	1.0
Port Arthur, Ont	29.30	30.01	+.05	37.5	− 8.4	46.6	28.5	0.88	−1.27	2.3
Winnipeg, Man	29.17	30.02	+.06	39.7	−11.9	51.8	27.7	0.97	−1.31	2.4
Minnedosa, Man	28.20	30.05	+.09	38.6	− 9.8	49.8	27.5	0.57	−0.88	3.2
Qu'Appelle, Sask	27.76	30.04	+.10	39.7	−10.1	51.3	28.0	1.06	−0.59	2.4
Medicine Hat, Alberta	27.68	29.97	+.08	48.5	− 5.6	60.0	37.0	0.65	−0.66	0.0
Swift Current, Sask	27.46	30.06	+.14	42.6	− 8.1	58.9	31.3	1.35	−0.41	1.6
Calgary, Alberta	26.16	30.01	+.13	44.2	− 4.8	56.3	32.0	1.04	−0.73	0.2
Banff, Alberta	25.39	29.99	+.11	42.8	− 4.2	54.4	31.2	3.33	+1.29	6.2
Edmonton, Alberta	27.71	30.02	+.14	43.6	− 7.2	55.0	31.5	1.60	+0.05	9.1
Prince Albert, Sask	28.48	30.07	+.12	37.9	− 9.7	49.3	26.4	1.69	+0.43	8.2
Battleford, Sask	28.30	30.07	+.14	40.6	−10.4	52.8	28.5	0.30	−1.32	0.6
Kamloops, B. C	28.70	29.91	+.02	61.5	+ 2.4	73.8	49.1	0.09	−1.15	0.0
Victoria, B. C	29.91	30.00	.00	56.0	+ 3.5	65.4	46.6	0.35	−1.13	0.0
Barkerville, B. C	25.65	29.95	+.11	44.5	− 1.0	55.3	33.7	1.06	−1.46	0.0
Hamilton, Bermuda	29.97	30.13	+.07	68.7	− 0.7	73.2	64.2	3.88	−0.78	0.0
Dawson, Yukon	28.75			51.5		64.0	39.0	1.06		3.0

TABLE VI.—*Heights of rivers referred to zeros of gages, May, 1907.*

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Milk River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Havre, Mont.	237	9	5.4	13	4.2	5, 6	4.7	1.2
Yellowstone River.								
Billings, Mont.	330	8	5.5	22	1.2	2-6, 9	3.2	4.3
Cheyenne River.								
Rousseau, S. Dak. (*)	7	12	.....	.....	0.1	20	0.8	.....
James River.								
Lamoure, N. Dak.	330	14	0.9	26-31	0.6	1-9	.....	0.3
Huron, S. Dak.	139	9	5.5	1	4.0	22	4.8	1.5
Big Blue River.								
Beatrice, Nebr.	92	14	6.9	29	2.4	2, 3, 8-15	3.3	4.5
Blue Rapids, Kans.	47	14	8.2	27	3.4	23-25	4.3	4.8
Republican River.								
Clay Center, Kans.	42	18	7.1	31	5.7	24-29	5.9	1.4
Solomon River.								
Beloit, Kans.	75	16	1.7	1-4, 6, 8-11, 13, 14, 23, 24, 27-29	0.6	12	1.4	1.1
Smoky Hill-Kansas River.								
Lindsborg, Kans.	318	20	1.6	13	1.0	19	1.3	0.6
Abilene, Kans.	254	22	0.5	6	0.0	1, 6, 14, 25, 29, 30,	0.2	0.5
Manhattan, Kans.	160	18	4.9	28	3.0	25, 26	3.4	1.9
Topeka, Kans.	87	21	7.3	31	5.8	27, 28	6.2	1.5
Osage River.								
Bagnell, Mo.	70	28	21.8	17	3.5	31	11.7	18.3
Gasconade River.								
Arlington, Mo.	98	16	12.2	8	0.9	1	3.5	11.3
Missouri River.								
Townsend, Mont.	2,504	11	7.0	24, 25	4.5	7, 8	5.6	2.5
Fort Benton, Mont.	2,285	12	5.3	25-28	2.4	7-9	3.8	2.9
Wolfpoint, Mont.	1,952	17	5.5	25	2.0	9-14	3.1	3.5
Bismarck, N. Dak.	1,309	14	9.6	30	2.7	12, 15	4.6	6.9
Pierre, S. Dak.	1,114	14	8.8	28, 29	2.4	19	4.2	6.4
Sioux City, Iowa	784	17	15.2	30	8.6	20, 21	9.8	6.6
Blair, Nebr.	705	15	13.9	31	6.8	13, 22	7.8	7.1
Omaha, Nebr.	669	18	17.6	31	10.1	24	11.2	7.5
Plattsmouth, Nebr.	641	17	8.2	31	3.5	21-24	4.4	4.7
St. Joseph, Mo	481	10	7.5	31	2.9	23, 24	3.8	4.6
Kansas City, Mo.	388	21	13.4	31	9.5	24	10.9	3.9
Glasgow, Mo.	231	18	9.5	17	6.8	28	8.4	2.7
Boonville, Mo.	199	20	14.1	16	9.6	26	11.4	4.5
Hermann, Mo.	103	24	16.2	17	8.7	29, 30	12.6	7.5
Minnesota River.								
Mankato, Minn.	127	18	6.8	30	4.7	24	5.4	2.1
St. Croix River.								
Stillwater, Minn.	23	11	10.2	31	6.6	15	7.8	3.6
Chippewa River.								
Chippewa Falls, Wis.	75	16	6.6	17	3.4	13	4.5	3.2
Red Cedar River.								
Cedar Rapids, Iowa	77	14	3.8	25, 26	3.1	21, 22	3.4	0.7
Des Moines River.								
Des Moines, Iowa	205	19	4.3	26	2.7	1, 6-14	2.7	1.6
Illinois River.								
La Salle, Ill.	197	18	18.6	28	15.6	22, 23	17.1	3.0
Peoria, Ill.	135	14	14.1	31	12.4	1, 2	13.1	1.7
Beardstown, Ill.	70	12	11.8	1	11.3	23, 24	11.5	0.5
Clarion River.								
Clarion, Pa.	32	10	3.5	1, 5	1.4	26	2.6	2.1
Conemaugh River.								
Johnstown, Pa.	64	7	5.0	10	2.4	6-8	3.0	2.6
Allegheny River.								
Warren, Pa.	177	14	5.1	28	1.7	26	3.0	3.4
Franklin, Pa.	114	15	7.0	28	2.6	15	4.1	4.4
Parker, Pa.	73	20	6.6	28	2.4	26	4.0	4.2
Freeport, Pa.	29	20	9.1	29	4.8	26	6.9	4.3
Springdale, Pa.	17	27	13.7	29	9.3	26	11.2	4.4
Cheat River.								
Rowlesburg, W. Va.	36	14	4.6	10	2.1	31	3.0	2.5
Youghiogheny River.								
Confluence, Pa.	59	10	6.0	9	1.4	18	2.2	4.6
West Newton, Pa.	15	23	9.5	9	1.7	19	3.0	7.8
Monongahela River.								
Weston, W. Va.	161	18	6.4	9	— 0.6	2, 3, 29-31	0.3	7.0
Fairmont, W. Va.	119	25	19.6	9	14.8	31	16.1	4.8
Greensboro, Pa.	81	18	13.5	9	7.7	31	9.0	5.8
Lock No. 4, Pa.	40	28	16.5	10	7.2	31	9.5	9.3
Beaver River.								
Ellwood Junction, Pa.	10	14	3.4	1	1.9	14-16, 20-26	2.3	1.5
Muskingum River.								
Zanesville, Ohio	70	25	17.8	28	9.2	23	11.5	8.6
Beverly, Ohio	20	25	15.8	28	7.2	18, 21-23	9.5	8.6
Little Kanawha River.								
Glenville, W. Va.	77	20	8.0	9	0.6	25	1.9	7.4
Creston, W. Va.	38	20	10.5	10	2.7	25	4.5	7.8
New-Great Kanawha River.								
Radford, Va.	155	14	2.3	8	0.4	23, 24	1.0	1.9
Hinton, W. Va.	95	14	4.5	8	2.0	23-25, 28, 30, 31	2.7	2.5
Charleston, W. Va.	58	30	8.1	9	4.7	20	6.5	3.4
Scioto River.								
Columbus, Ohio	110	17	9.0	27	2.5	23	3.9	6.5
Licking River.								
Falmouth, Ky.	30	25	10.5	11	2.0	24, 31	4.0	8.5
Miami River.								
Dayton, Ohio	77	18	2.7	27	1.6	23, 24	2.0	1.1
Kentucky River.								
Beattyville, Ky.	254	30	8.0	8	0.2	5, 25	1.3	7.8
High Bridge, Ky.	117	17	17.5	9	9.6	31	11.4	7.9
Frankfort, Ky.	65	31	12.4	10	6.3	24-26, 31	7.5	6.1
Wabash River.								
Terre Haute, Ind.	171	16	7.0	28, 29	1.9	24	4.0	5.1
Mount Carmel, Ill.	75	15	9.2	2	5.3	15	6.8	3.9
Cumberland River.								
Burnside, Ky.	518	50	23.0		2.2	31	6.5	20.8
Cumberland River—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Celina, Tenn.	383	45	26.7	10	3.4	31	9.5	23.3
Carthage, Tenn.	308	40	24.9	10	3.0	30	9.1	21.9
Nashville, Tenn.	193	40	29.5	11	9.0	30, 31	15.7	20.5
Clarksville, Tenn.	126	43	39.0	11	7.4	31	19.5	31.6
Powell River.								
Tazewell, Tenn.	44	20	6.0	7	1.0	31	1.9	5.0
Clinch River.								
Speers Ferry, Va.	156	20	6.8	7	0.1	29-31	1.3	6.7
Clinton, Tenn	52	25	17.0	9	4.2	31	7.1	12.8
South Fork Holston River.								
Bluff City, Tenn.	35	15	3.9	7	1.0	25-31	1.7	2.9
Holston River.								
Mendota, Va.	165	8	6.0	7	1.0	30, 31	1.9	5.0
Rogersville, Tenn.	103	14	5.4	8	2.1	30, 31	2.8	3.3
French Broad River.								
Asheville, N. C.	144	6	1.0	4	— 0.2	21-25, 30	0.3	1.2
Dandridge, Tenn.	46	12	3.5	8	1.2	31	1.9	2.3
Little Tennessee River.								
McGhee, Tenn.	17	20	6.1	8	3.7	30	4.5	2.4
Hiwassee River.								
Charleston, Tenn	18	22	7.2	12	2.4	25, 30	3.7	4.8
Tennessee River.								
Knoxville, Tenn.	635	12	7.0	9	1.7	31	3.2	5.3
Loudon, Tenn.	590	25	6.7	8	2.2	31	3.5	4.5
Kingston, Tenn.	556	25	8.9	9	2.4	28-31	4.2	6.5
Chattanooga, Tenn.	452	33	12.5	11	4.4	26, 27, 30, 31	7.0	8.1
Bridgeport, Ala	402	24	11.0	11	2.8	28, 31	5.6	8.2
Guntersville, Ala.	349	31	17.6	12	5.5	29	9.9	12.1
Florence, Ala.	255	16	12.5	12	3.0	28-30	6.9	9.5
Riverton, Ala.	225	26	20.5	12	5.9	29	12.0	14.6
Johnsonville, Tenn.	95	21	22.1	16	5.9	31	14.8	16.2
Ohio River.								
Pittsburg, Pa.	966	22	11.1	10	4.0	27	5.8	7.1
Dam No. 2, Pa.	956	25	10.5	10	5.4	16, 17, 27	6.9	5.1
Beaver Dam, Pa.	925	27	15.4	11	8.0	26	10.4	7.4
Wheeling, W. Va.	875	36	15.3	11	8.0	25	10.1	7.3
Parkersburg, W. Va.	785	36	15.4	12	9.0	17, 18	11.4	6.4
Point Pleasant, W. Va.	703	39	20.6	1	9.2	19	13.8	11.4
Huntington, W. Va.	660	50	25.6	1	13.5	23	18.5	12.1
Catlettsburg, Ky.	651	50	26.4	1	13.1	23	18.5	13.3
Portsmouth, Ohio	612	50	28.0	1	13.8	24	19.8	14.2
Maysville, Ky.	559	50	28.5	1	14.4	24	20.1	14.1
Cincinnati, Ohio	499	50	30.9	1	16.2	25	22.5	14.7
Madison, Ind	413	46	26.3	12	14.4	22	19.8	11.9
Louisville, Ky.	367	28	10.1	12, 13	6.4	23	8.3	3.7
Evansville, Ind.	184	35	26.8	15	13.1	27	20.1	13.7
Mount Vernon, Ind.	148	35	25.5	15, 16	12.7	28	19.6	12.8
Paducah, Ky.	47	40	30.9	16, 17	12.9	31	23.7	18.0
Cairo, Ill.	1	45	38.4	19	22.5	30	32.5	15.9
St. Francis River.								
Marked Tree, Ark.	104	17	16.6	18, 19, 23, 24	13.1	4, 5	15.3	3.5
Neosho River.								
Neosho Rapids, Kans.	326	22	5.0	7	1.3	28, 29	2.0	3.7
Iola, Kans.	262	10	3.2	6, 7	0.3	29, 30	1.0	2.9
Oswego, Kans.	184	20	11.6	7	0.8	28-31	3.7	10.8
Fort Gibson, Ind. T.	3	22	23.5	17	10.7	31	14.7	12.8
Canadian River.								
Calvin, Ind. T.	99	10	4.2	29	2.5	22	3.3	1.7
Black River.								
Blackrock, Ark.	67	12	24.7	8	9.8	1	19.4	14.9
White River.								
Calicorock, Ark.	272	18	35.6	7	3.3	31	11.4	32.3
Batesville, Ark.	217	18	33.1	8	5.5	31	14.4	27.6
Newport, Ark. (*)	185	26	30.7	11	17.8	1	24.6	12.9
Clarendon, Ark.	75	30	34.2	18	23.3	1	29.3	10.9
Arkansas River.								
Wichita, Kans.	832	10	— 0.3	7	— 1.1	21-24, 27-29	— 0.9	0.8
Tulsa, Ind. T.	551	16	7.8	17	3.6	26, 27	5.2	4.2
Webbers Falls, Ind. T.	465	23	19.4	17	6.4	27-29	11.3	13.0
Fort Smith, Ark.	403	22	19.3	17, 18	6.8	25, 26	12.3	12.5
Dardanelle, Ark.	256	21	18.8	11	7.4	27	12.7	11.4
Little Rock, Ark.	176	23	21.2	11	9.3	1	15.5	11.9
Pine Bluff, Ark.	121	23	23.7	12	9.9	1	18.1	13.8
Yazoo River.								
Greenwood, Miss	175	38	30.7	31	14.8	1	24.4	15.9
Yazoo City, Miss.	80	25	23.6	31	15.4	6, 7	19.6	8.2
Ouachita River.								
Camden, Ark.	304	39	35.3	12	13.4	24	24.8	21.9
Monroe, La	122	40	36.5	30	27.5	1	33.4	9.0
Red River								
Denison, Tex.	768	22	12.1	27	1.2	3, 4	4.1	10.9
Arthur City, Tex.	688	27	23.0	28	8.1	23	12.3	14.9
Fulton, Ark.	515	28	30.0	31	15.0	25	22.7	15.0
Shreveport, La.	327	29	18.8	21	9.2	1	15.9	9.6
Alexandria, La.	118	33	28.7	24	10.2	1	24.9	18.5
Mississippi River.								
Fort Ripley, Minn. (*)	2,082	10	7.9	30, 31	5.7	13	6.5	2.2
St. Paul, Minn.	1,954	14	8.7	31	6.0	15	6.8	2.7
Red Wing, Minn.	1,914	14	6.7	31	5.2	15-17	5.8	1.5
Reeds Landing, Minn.	1,884	12	6.1	31	5.0	14-16	5.5	1.1
La Crosse, Wis.	1,819	12	7.4	1, 2	6.1	17, 18	6.8	1.3
Prairie du Chien, Wis.	1,759	18	9.0	1	6.9	20, 21	7.7	2.1
Dubuque, Iowa	1,699	18	10.0	1	7.5	20-22	8.6	2.5
Clinton, Iowa	1,629	16	9.6	1	6.8	22	8.0	2.8
Leclaire, Iowa	1,609	10	6.5	1	4.0	22, 24	5.1	2.5
Davenport, Iowa	1,593	15	8.6	1	5.9	22	7.2	2.7
Muscatine, Iowa	1,562	16	10.1	1	7.2	22	8.6	2.9
Galland, Iowa	1,472	8	5.1	1	3.4	22, 23	4.2	1.7
Keokuk, Iowa	1,463	15	8.9	1	5.6	23	7.3	3.3
Warsaw, Ill.	1,458	18	11.7	1	8.4	23	10.1	3.3
Hannibal, Mo	1,402	13	10.2	1	6.4	24	8.4	3.8
Grafton, Ill	1,306	23	13.8	1	9.3	25, 26	11.4	4.5
St. Louis, Mo	1,264	30	21.3	18	14.0	27	17.7	7.3

TABLE VI.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Flood stage on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Mississippi River—Cont'd.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Chester, Ill	1,189	30	18.6	19	12.0	28	15.5	6.6
Cape Girardeau, Mo	1,128	28	23.5	19	16.4	28	20.2	7.1
New Madrid, Mo	1,003	34	30.7	19	18.5	31	26.4	12.2
Luxora, Ark	905	33	25.3	15,16	12.0	31	20.4	13.3
Memphis, Tenn	843	33	31.7	15	17.5	31	26.8	14.2
Helena, Ark	767	42	40.7	18–21	27.2	31	36.0	13.5
Arkansas City, Ark	635	42	47.9	25	33.7	1–3	42.4	14.2
Greenville, Miss	595	42	42.2	25,26	28.1	1–3	36.3	14.1
Vicksburg, Miss	474	45	45.5	27,28	33.0	5,6	39.8	12.5
Natchez, Miss	373	46	45.9	31	34.7	6	40.2	11.2
Baton Rouge, La	240	35	35.1	31	26.0	7	29.9	9.1
Donaldsonville, La	188	28	28.0	31	20.8	6,7	23.5	7.2
New Orleans, La	108	16	18.0	31	13.6	7	15.3	4.4
Atchafalaya River.								
Simmesport, La	127	33	40.4	31	31.5	7	35.1	8.9
Melville, La	108	31	36.3	31	31.5	6,7	33.3	4.8
Morgan City, La. (*)	19	8	5.6	14,15	3.5	6	4.5	2.1
Sandusky River.								
Tiffin, Ohio	65	7	3.6	28	0.7	21,22	1.6	2.9
Grand River.								
Grand Rapids, Mich	38	11	7.6	5	2.1	22–25	3.7	5.5
Connecticut River.								
Hartford, Conn	50	16	14.5	5,6	5.6	27	9.5	8.9
Mohawk River.								
Utica, N. Y	98	6	5.8	5	0.5	28	3.1	5.3
Tribeshill, N. Y	42	12	3.7	2	0.4	26	1.7	3.3
Schenectady, N. Y	19	15	4.7	4	1.3	25,26	2.3	3.4
Hudson River.								
Troy, N. Y	154	14	9.0	2	5.0	30,31	6.7	4.0
Albany, N. Y	147	12	7.5	1–3	2.0	22	5.1	5.5
Passaic River.								
Chatham, N. J	69	7	4.8	18	2.5	31	3.2	2.3
Lehigh River.								
Mauch Chunk, Pa	45	15	4.7	17,18	4.4	1–4, 6–9, 23–31	4.4	0.3
Schuylkill River.								
Reading, Pa	66	12	0.9	11	0.3	26,30,31	0.6	0.6
Delaware River.								
Hancock (E. Branch), N. Y	287	12	4.6	5	3.5	26	4.0	1.1
Hancock (W. Branch), N. Y	287	10	5.1	1	3.4	25,26,31	4.1	1.7
Port Jervis, N. Y	215	14	2.7	9	1.1	26	1.9	1.6
Phillipsburg, N. J	146	26	3.7	10,11	2.2	26,27	3.0	1.5
Trenton, N. J	92	18	3.7	7	2.0	28–31	2.7	1.7
North Branch Susquehanna.								
Binghamton, N. Y	183	16	6.0	22	2.3	26	3.6	3.5
Towanda, Pa	139	16	5.7	2	1.9	27	3.2	3.8
Wilkes-Barre, Pa	60	17	9.7	3	4.4	27	6.5	5.3
West Branch Susquehanna.								
Clearfield, Pa	165	8	2.8	10	1.1	24,25	1.6	1.7
Renovo, Pa	90	16	4.8	11	1.8	24,25,30,31	3.0	3.0
Williamsport, Pa	39	20	6.0	11	2.2	26,27,31	3.7	3.8
Juniata River.								
Huntingdon, Pa	90	24	5.6	10	3.5	31	4.1	2.1
Susquehanna River.								
Selinsgrove, Pa	116	17	4.8	1	2.0	26,27	3.1	2.8
Harrisburg, Pa	69	17	5.6	1	2.4	28–30	3.7	3.2
Shenandoah River.								
Riverton, Va	58	22	0.4	18,19	− 0.8	22–31	−0.4	1.2
Potomac River.								
Cumberland, Md	290	8	6.0	9	3.9	1–7	4.4	2.1
Harpers Ferry, W. Va	172	18	8.8	11	2.6	25	3.6	6.2
James River.								
Buchanan, Va	305	12	5.7	8	2.8	31	3.7	2.9
Lynchburg, Va	260	18	4.0	8	1.3	23,24	2.3	2.7
Columbia, Va	167	18	12.3	9	4.4	31	6.2	7.9
Richmond, Va	111	12	4.5	10	0.4	26	1.3	4.1
Dan River.								
Danville, Va	55	8	0.8	11	− 0.1	23–25	0.2	0.9
Staunton River.								
Randolph, Va	26	28	12.5	9	4.4	31	7.0	8.1
Roanoke River.								
Clarksville, Va	196	12	2.3	9	0.2	31	1.1	2.1
Weldon, N. C	129	30	16.7	10	10.3	23–25, 31	11.5	6.4
Tar River.								
Tarboro, N. C	46	25	13.6	7	3.6	25	7.1	10.0
Greenville, N. C	21	22	12.0	7,8	4.6	25	8.3	7.4
Haw River.								
Moncure, N. C	171	25	11.4	4	2.0	24,26,29	4.9	9.4
Cape Fear River.								
Fayetteville, N. C	112	38	17.4	5	3.7	24,25	7.3	13.7
Waccamaw River.								
Conway, S. C	40	7	5.0	1–4	3.0	28–31	3.9	2.0
Pedee River.								
Cheraw, S. C	149	27	6.9	13	2.0	26	4.0	4.9
Smiths Mills, S. C	51	16	12.9	3	4.0	27,28	9.1	8.9
Lynch Creek.								
Effingham, S. C	35	12	8.7	16	4.0	27	6.3	4.7
Black River.								
Kingstree, S. C	45	12	8.0	22,23	5.0	17	6.8	3.0
Catawba-Wateree River.								
Mount Holly, N. C	143	15	2.4	3,4,9,26	1.8	21–25	2.0	0.6
Catawba, S. C	107	11	3.7	11	1.9	22	2.5	1.8
Camden, S. C	37	24	9.3	5	4.9	20	6.7	4.4
Broad River.								
Blairs, S. C	36	14	3.6	5	0.1	17	1.2	3.5
Saluda River.								
Pelzer, S. C	109	7	5.0	9	2.5	29,30	3.4	2.5
Chappels, S. C	56	14	6.0	4	2.2	24	3.5	3.8
Congaree River.								
Columbia, S. C	52	15	4.0	4	0.5	26	1.6	3.5
Santee River.								
Rimini, S. C	108	12	11.8	1	5.4	26	9.0	6.4
St. Stephens, S. C	50	10	8.9	4–6	3.2	25–29	6.8	5.7
Edisto River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Edisto, S. C	75	6	5.0	11–13	2.6	26	3.9	2.4
Broad River.								
Carlton, Ga	30	11	3.1	7	2.3	22–24	2.7	0.8
Savannah River.								
Calhoun Falls, S. C	347	15	4.0	4	2.8	23,24,30,31	3.4	1.2
Augusta, Ga	268	32	10.6	10	7.4	24	8.7	3.2
Oconee River.								
Milledgeville, Ga	147	25	6.6	28	2.5	23,24	3.6	4.1
Dublin, Ga	79	30	6.2	10	0.5	26,27	2.5	5.7
Ocmulgee River.								
Macon, Ga	203	18	7.0	9	2.2	31	3.8	4.8
Abbeville, Ga	96	11	10.0	1	3.3	29,30	6.6	6.7
Flint River.								
Woodbury, Ga	227	10	2.7	15,16	0.7	24,25,30,31	1.4	2.0
Montezuma, Ga	152	20	11.0	3	3.7	30,31	6.4	7.3
Albany, Ga	90	20	9.0	1	2.0	31	5.8	7.0
Bainbridge, Ga	29	22	10.9	1	4.3	31	7.6	6.6
Chattahoochee River.								
Oakdale, Ga	305	18	7.0	7	4.0	1–3, 5, 6, 20–22	4.9	3.0
West Point, Ga	239	20	8.3	16	3.3	24	4.4	5.0
Eufaula, Ala	90	40	17.7	17	5.1	8	8.6	12.6
Alaga, Ala	30	25	18.0	1	5.8	27,28	9.8	12.2
Coosa River.								
Rome, Ga	266	30	11.6	16	3.0	29,30	4.3	8.6
Gadsden, Ala	162	22	14.8	17	4.0	24	6.4	10.8
Lock No. 4, Ala	113	17	12.6	17	3.5	24	5.9	9.1
Wetumpka, Ala	12	45	30.3	17	9.8	24	15.4	20.5
Tallapoosa River.								
Milstead, Ala	42	35	25.0	16	4.7	23,26	8.4	20.3
Alabama River.								
Montgomery, Ala	323	35	28.9	18	7.3	31	13.2	21.6
Selma, Ala	246	35	33.5	19	10.8	25	17.7	22.7
Black Warrior River.								
Tuscaloosa, Ala	90	43	44.6	16	12.5	25	24.5	32.1
Tombigbee River.								
Columbus, Miss	316	33	15.6	11	2.5	26	11.9	13.1
Vienna, Ala	246	42	25.7	10,11	6.0	1	19.6	19.7
Demopolis, Ala	168	35	47.0	17	17.1	1	37.7	29.9
Leaf River.								
Hattiesburg, Miss	60	20	19.8	18	5.2	1	10.9	14.6
Chickasawhay River.								
Enterprise, Miss	144	18	21.0	17	4.0	23,30	11.7	17.0
Shubuta, Miss	106	25	32.0	18,19	11.0	25	23.5	21.0
Pascagoula River.								
Merrill, Miss	78	20	21.8	21	14.2	3	18.8	7.6
Pearl River.								
Jackson, Miss	242	20	23.3	16,17	9.6	1	16.9	13.7
Columbia, Miss	110	14	23.2	19	8.0	1	16.1	15.2
Sabine River.								
Logansport, La	315	25	24.5	31	16.0	1	21.4	8.5
Neches River.								
Rockland, Tex	105	20	23.3	12	6.3	1	16.9	17.0
Beaumont, Tex	18	10	8.6	31	1.7	1	4.8	6.9
Trinity River.								
Dallas, Tex	320	25	29.7	29	5.8	7	14.7	23.9
Long Lake, Tex	211	35	38.8	19	5.1	1	28.1	33.7
Riverside, Tex	112	40	30.5	31	7.0	2,3	20.3	23.5
Liberty, Tex	20	25	25.4	31	7.3	1	19.8	18.1
Brazos River.								
Kopperl, Tex	345	21	3.8	15,16	0.8	1,5–7	1.9	3.0
Waco, Tex	285	24	11.1	29	2.4	2	5.7	8.7
Valley Junction, Tex	215	40	16.0	31	2.0	7,8	5.7	14.0
Hempstead, Tex	140	40	28.0	31	− 0.8	1	8.2	28.8
Booth, Tex	61	39	27.5	31	2.4	1–3	8.4	25.1
Colorado River.								
Ballinger, Tex	489	21	5.0	30	0.5	1–9, 21–28	1.0	4.5
Austin, Tex	214	18	10.2	30	0.8	1	2.7	9.4
Columbus, Tex	98	24	35.0	31	6.5	1,5–8	10.8	28.5
Guadalupe River.								
Gonzales, Tex	112	22	29.1	31	0.3	5–7, 16–21	2.6	28.8
Victoria, Tex	35	16	16.8	31	1.1	19,20	3.2	15.7
Rio Grande.								
San Marcial, N. Mex	1233	14	11.7	10	9.4	1, 11–13	10.2	2.3
El Paso, Tex	1030	14	12.6	30,31	9.8	15,16	10.6	2.8
Red River of the North.								
Moorhead, Minn	284	26	12.1	1	10.8	25,26	11.3	1.3
Kootenai River.								
Bonners Ferry, Idaho	123	24	22.6	21,22	5.7	1,2	16.1	16.9
Pend D'oreille River.								
Newport, Wash	85	14	14.6	29–31	6.4	3–7	9.9	8.2
Snake River.								
Lewiston, Idaho	144	24	15.6	20	7.8	1	12.3	7.8
Columbia River.								
Wenatchee, Wash	473	40	33.6	31	14.0	1,2	23.1	19.6
Umatilla, Oreg	270	25	19.0	31	10.2	2,3	14.7	8.8
The Dalles, Oreg	166	40	31.0	31	15.7	2,3	23.3	15.3
Willamette River.								
Albany, Oreg	118	20	4.0	1,12,21	3.0	25–31	3.5	1.0
Salem, Oreg	84	20	3.1	1	1.9	30,31	2.5	1.2
Portland, Oreg	12	15	17.6	31	8.7	4	12.9	8.9
Sacramento River.								
Kennett, Cal. (j)	323	23	4.5	19	2.9	31	3.8	1.6
Red Bluff, Cal	265	23	6.3	1	4.0	25–31	5.1	2.3
Colusa, Cal	156	25	15.4	1	10.8	30,31	12.9	4.6
Knights Landing, Cal	99	.....	15.7	1	13.7	31	14.8	2.0
Sacramento, Cal	64	25	20.1	1,2	19.2	24	19.6	0.9
Riovista, Cal	26	12	.....	.....	.....	.....	.....	.....
San Joaquin River.								
Pollasky, Cal	203	10	7.4	20	4.1	6	5.4	3.3
Firebaugh, Cal	148	.....	11.5	1,31	9.8	16,17	10.9	1.7
Lathrop, Cal	49	14	16.3	21,22	15.4	10,11,17	15.8	0.9

(*) One day missing. (*) Three days missing. (*) Five days missing. (j) Ten days missing.

Honolulu, T. H., latitude 21° 19′ north, longitude 157° 30′ west; barometer above sea, 38 feet; gravity correction, —0.057 inch, applied. May, 1907.

Day.	Pressure.*		Air temperature.				Moisture.				Wind.				Precipitation.		Clouds.					
							8 a. m.		8 p. m.		8 a. m.		8 p. m.				8 a. m.			8 p. m.		
	8 a. m.	8 p. m.	8 a. m.	8 p. m.	Maximum.	Minimum.	Wet.	Relative humidity.	Wet.	Relative humidity.	Direction.	Velocity.	Direction.	Velocity.	8 a. m.	8 p. m.	Amount.	Kind.	Direction.	Amount.	Kind.	Direction.
1	30.06	29.98	74.4	72.5	80	70	66.0	64	65.5	69	ne.	8	e.	4	0.00	0.00	2	Cu.	ne.	0	0	0
2	30.02	30.00	75.4	73.0	82	68	68.0	68	67.0	73	nw.	4	e.	8	0.00	0.00	2	A.-cu.	ne.	0	0	0
3	30.02	30.01	78.0	74.0	82	69	67.5	58	68.0	74	nw.	4	ne.	3	0.00	0.00	4	Ci.	w.	6 4	A.-s. Cu.	0 ne.
4	30.05	30.05	75.5	73.0	82	69	68.0	68	67.0	73	w.	4	ne.	12	0.00	0.00	2	Cu.	e.	0	0	0
5	30.08	30.04	75.4	74.0	81	70	66.0	61	68.0	74	ne.	10	ne.	8	0.00	0.00	few.	Cu.	0	1	Cu.	ne.
6	30.08	30.02	72.3	74.0	80	70	67.0	76	65.0	61	ne.	4	ne.	12	T.	0.06	7	N.	e.	0	0	0
7	30.04	30.01	75.3	73.0	80	69	65.8	60	65.0	65	ne.	3	ne.	6	0.00	0.00	6 2	Ci.-cu. Cu.	w. e.	0	0	0
8	30.06	30.04	76.5	73.0	81	68	67.0	61	67.0	73	ne.	4	ne.	10	0.00	T.	1 1	Cu. Cu.-n.	e. 0	few.	Cu.	ne.
9	30.08	30.08	75.5	76.0	82	70	67.5	66	69.0	70	s.	2	ne.	12	0.00	T.	1	Cu.	e.	3	S.	e.
10	30.13	30.11	75.2	73.0	80	72	68.0	69	69.0	82	ne.	6	e.	12	T.	0.02	7	Cu.	e.	3	S.	e.
11	30.09	30.02	75.0	74.0	80	71	65.2	59	66.5	67	ne.	17	ne.	12	0.00	T.	6	Cu.	e.	5	S.	ne.
12	30.03	29.99	75.0	73.5	80	71	66.5	64	66.0	67	ne.	7	ne.	14	0.00	0.00	6	Cu.	e.	4	S	ne.
13	30.01	30.00	75.4	74.0	81	71	65.0	57	67.0	69	ne.	7	ne.	12	0.00	0.00	3	Cu.	e.	2	S.	e.
14	30.03	30.00	77.0	72.5	80	70	68.0	63	68.0	80	n.	4	n.	10	T.	T.	6	Cu.	e.	9	N.	e.
15	30.02	30.02	76.5	73.0	80	70	69.0	68	68.0	78	ne.	8	nw.	2	0.02	0.00	3	Cu.	e.	7	S.	e.
16	30.00	29.99	73.4	72.0	79	70	68.0	76	66.0	73	n.	3	nw.	5	0.01	T.	8	S.-cu.	e.	10	Cu.	nw.
17	30.01	30.03	75.7	72.5	80	70	68.0	67	67.0	75	ne.	7	ne.	10	T.	T.	6	S.-cu.	n.	1 1	A.-s. Cu.	n. e.
18	30.03	29.98	76.0	74.0	82	71	67.0	62	68.0	74	e.	9	e.	4	0.00	0.00	9	S.-cu.	e.	10	S.	e.
19	30.02	29.99	76.4	75.0	79	70	70.0	72	71.0	82	ne.	3	se.	6	0.00	0.00	1	Cu.	e.	3	Cu.	se.
20	30.00	30.00	76.0	73.5	79	69	69.0	70	71.0	88	s.	8	nw.	3	0.00	0.03	1	Cu.	e.	5	Cu.	nw.
21	30.01	30.02	79.0	74.0	83	70	67.3	54	68.0	74	ne.	5	ne.	4	0.00	0.00	few.	Cu.	e.	few.	Cu.	ne.
22	30.03	30.01	78.0	74.5	83	70	67.2	57	68.0	72	e.	2	ne.	12	0.00	0.00	4	Cu.	e.	6	Cu.	ne.
23	30.04	30.01	79.0	75.0	80	70	69.0	60	69.0	74	e.	5	s.	2	0.00	0.00	4	Cu.	e.	9	Cu.	s.
24	30.04	30.00	76.3	74.0	79	70	69.3	70	69.0	78	sw.	6	n.	3	0.00	0.00	1	Cu.	sw.	1 2	Ci. A.-s.	0 nw.
25	30.02	29.99	76.0	77.0	84	69	67.0	62	69.0	67	s.	4	ne.	3	0.00	0.00	few.	A.-s.	0	10	S.	sw.
26	29.95	29.91	77.0	76.5	80	72	72.5	81	71.0	76	e.	7	s.	9	0.03	T.	7	Cu.	e.	1 3	A.-s. Cu.	se. s.
27	29.90	29.87	76.0	75.5	78	70	71.0	78	73.0	89	sw.	12	s.	10	0.20	0.09	10	S.-cu.	sw.	1 8	A.-s. Cu.	0 s.
28	29.88	29.91	77.0	75.2	80	72	73.0	83	71.2	82	sw.	18	n.	2	0.00	0.05	9 1	S.-cu. Cu.	sw. sw.	9	S.	0
29	29.97	29.98	75.5	75.0	80	71	70.0	76	71.0	82	e.	9	s.	2	0.04	0.00	9	A.-s.	ne.	10	S.	s.
30	30.03	30.02	79.0	76.0	80	73	73.0	75	74.0	91	se.	8	se.	6	T.	0.08	6 2	A.-cu. Cu.	se. se.	9	S.	se.
31	30.04	30.02	75.0	77.0	80	73	73.0	91	73.0	83	s.	6	ne.	2	0.04	T.	9	S.-cu.	e.	9	Cu.	ne.
Mean	30.023	30.003	76.1	74.2	80.5	70.3	68.3	67.6	68.6	75.3	ne.	6.6	ne.	7.1	0.34	0.33	4.7	Cu.	e.	4.9	Cu.	ne.

Observations are made at 8 a. m. and 8 p. m., local standard time, which is that of 157° 30′ west, and is 5h and 30m slower than 75th meridian time. *Pressure values are reduced to sea level and standard gravity.

RAINFALL IN JAMAICA.

Thru the kindness of Dr. H. H. Cousins, chemist to the government of Jamaica and now in charge of the meteorological service of that island, we have received the following table:

The rainfall for May was less than one-half the average in the northeastern and west-central divisions, while it was below the average in the northern and southern divisions. For the whole island the rainfall was a little more than half the average. The greatest fall, 20.03 inches, occurred at Darliston, in the west-central division, while no rain fell at Amity Hall and Alligator Pond, in the southern division.

Comparative table of rainfall.

[Based upon the average stations only.]

MAY, 1907.

Divisions.	Relative area.	Number of stations.	Rainfall.	
			1907.	Average.
	Per cent.		*Inches.*	*Inches.*
Northeastern division	25	22	4.78	11.97
Northern division	22	49	4.23	6.99
West-central division	26	24	5.42	11.66
Southern division	27	29	6.05	8.24
Means	100	....	5.12	9.71

 Chart I. Hydrographs for Seven Principal Rivers of the United States, May, 1907.

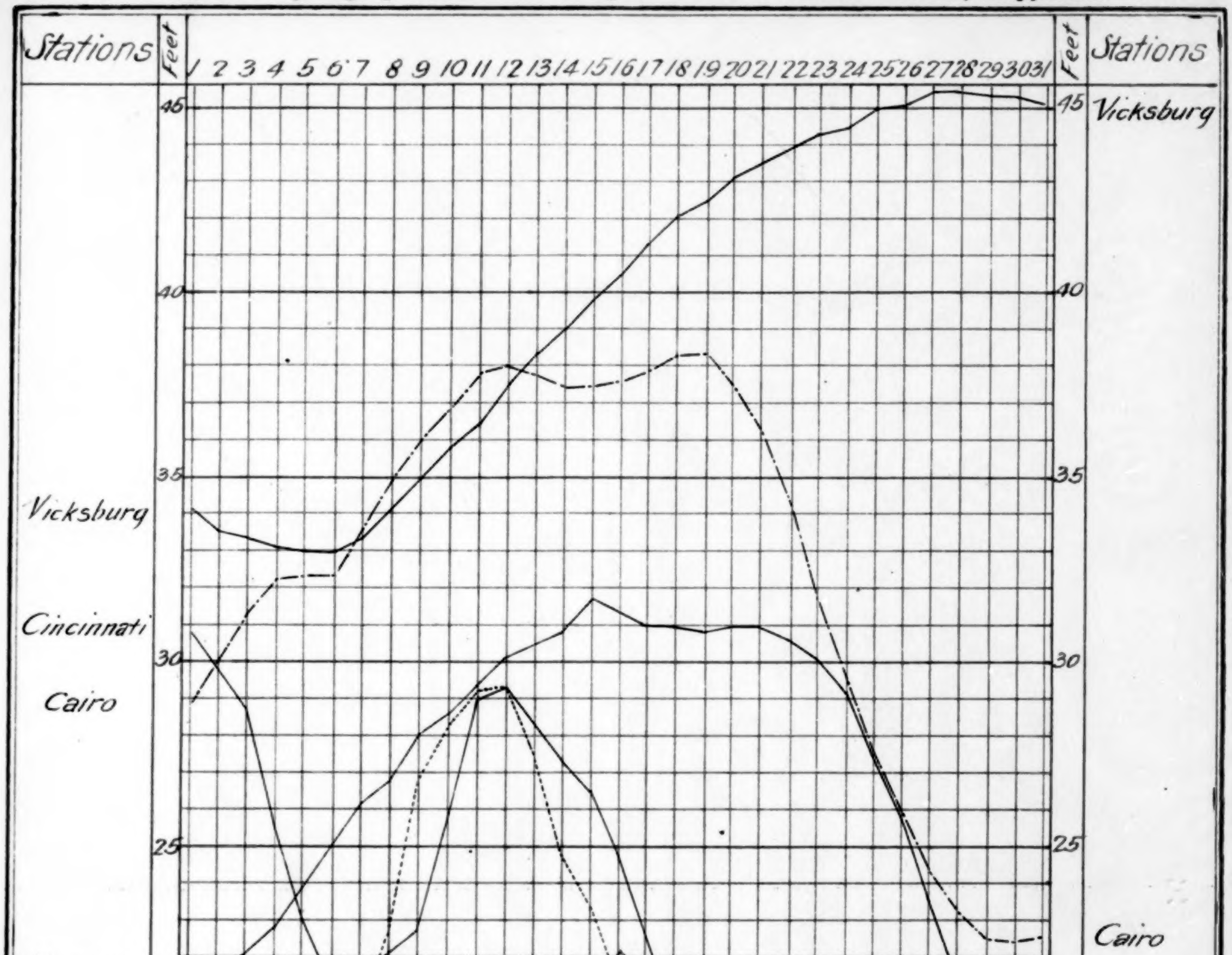


Chart II. Tracks of Centers of High Areas, May, 1907.

Chart III. Tracks of Centers of Low Areas, May, 1907.

Chart III. Tracks of Centers of Low Areas, May, 1907.

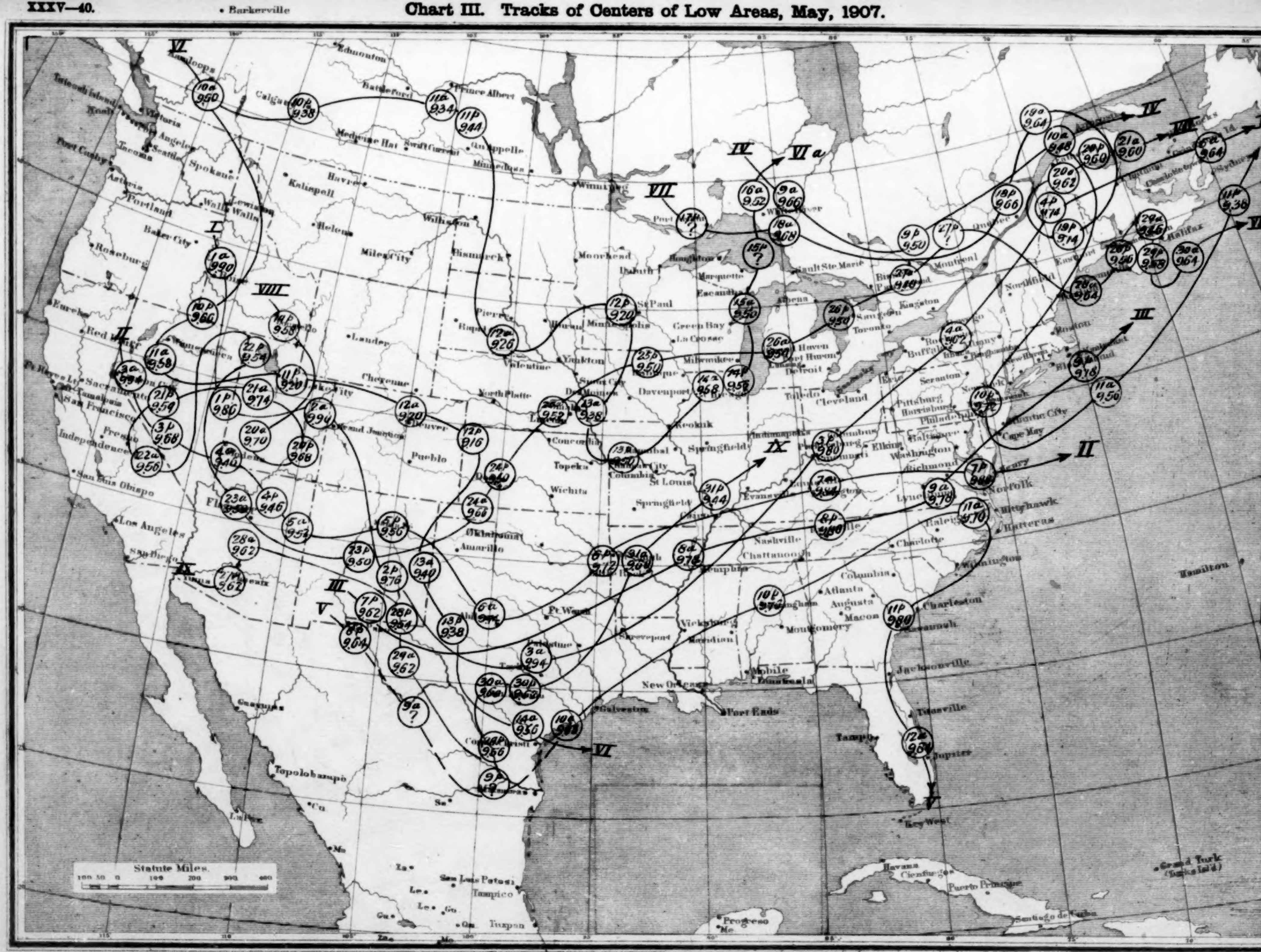


Chart IV. Total Precipitation, May, 1907.

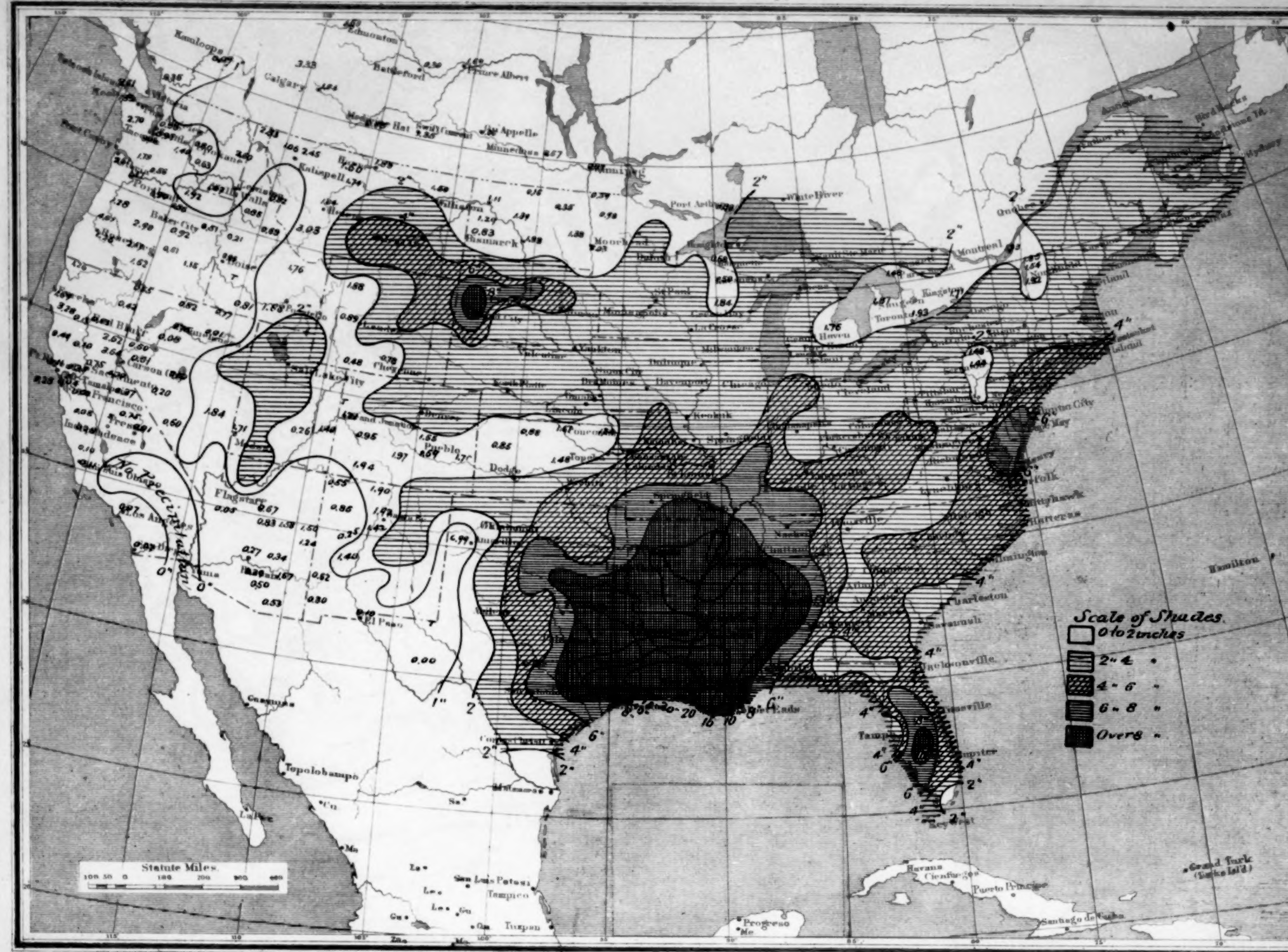


Chart V. Percentage of Clear Sky between Sunrise and Sunset, May, 1907.

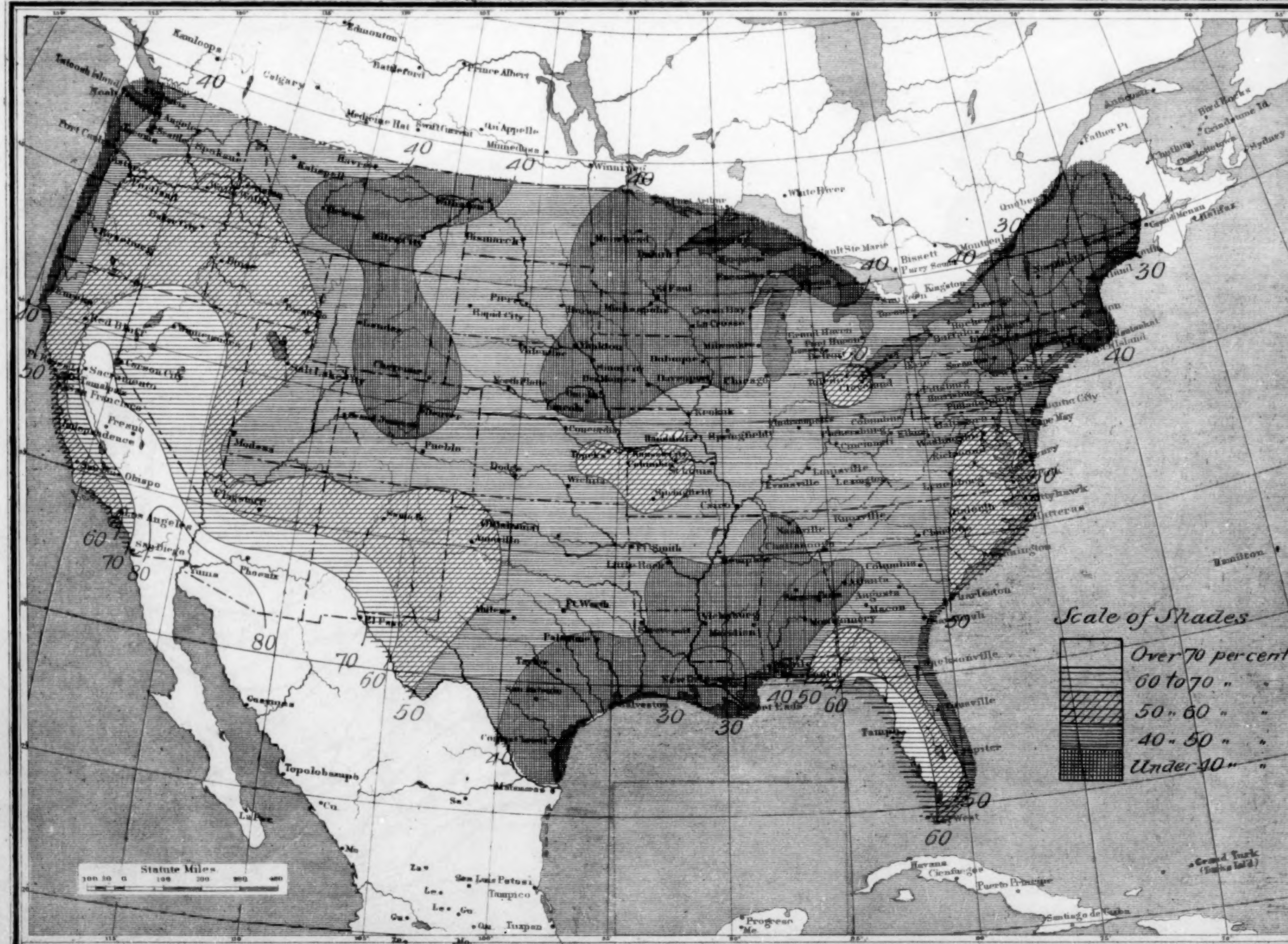
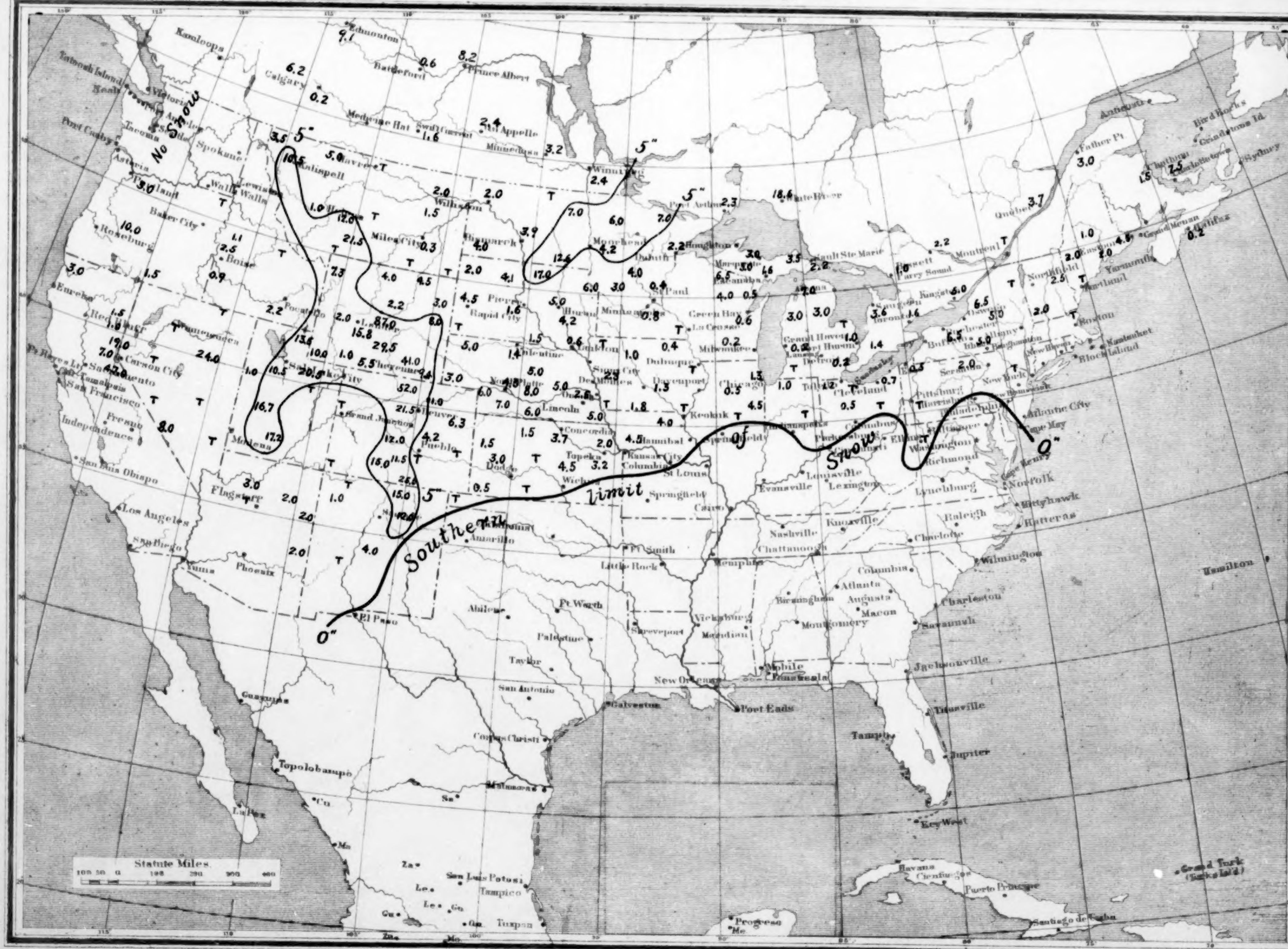


Chart VI. Isobars and Isotherms at Sea Level; Surface Wind Resultants, May, 1907.

Chart VII. Total Snowfall for May, 1907.



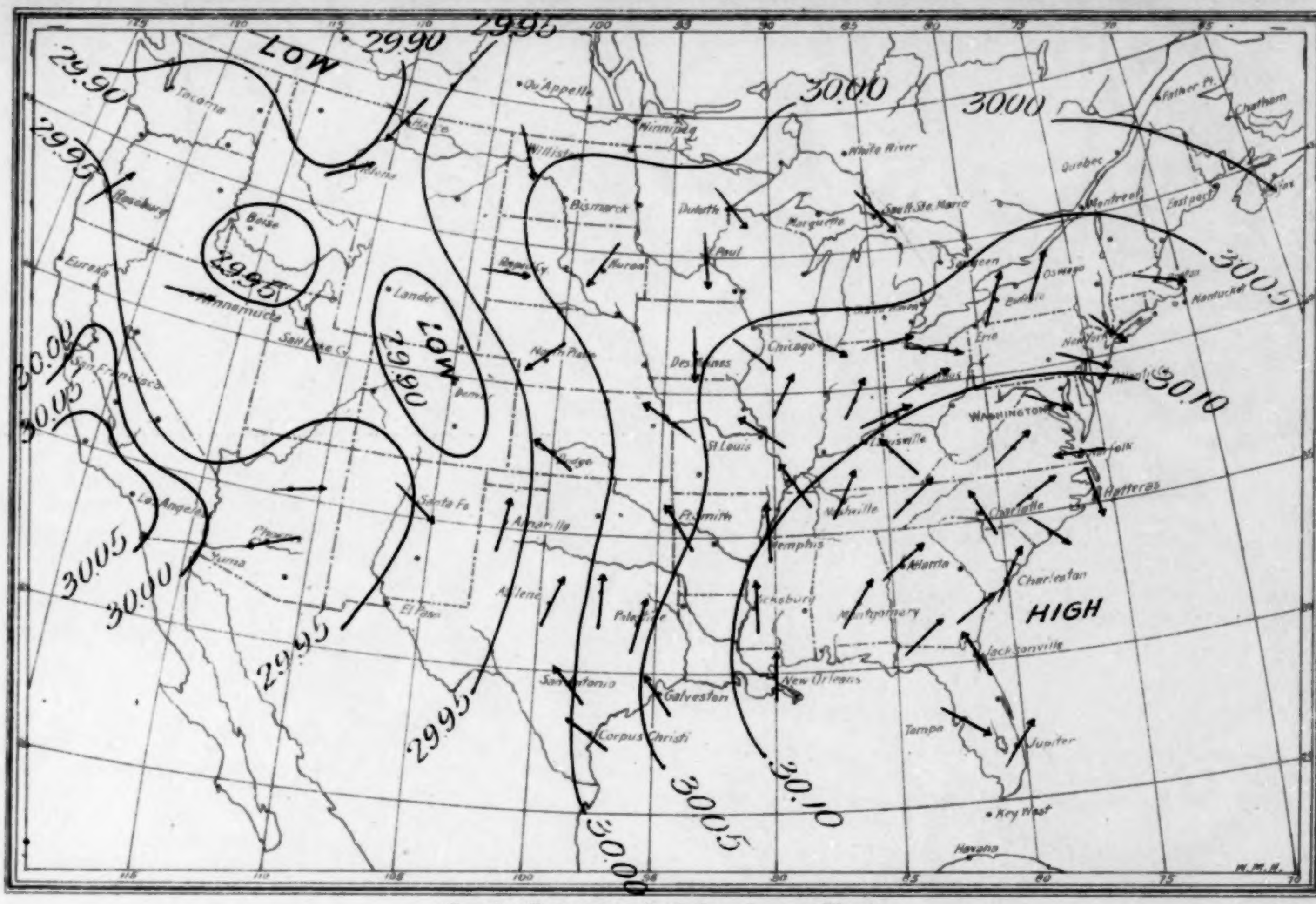


FIG. 1.—Pressure and winds. A warm March.

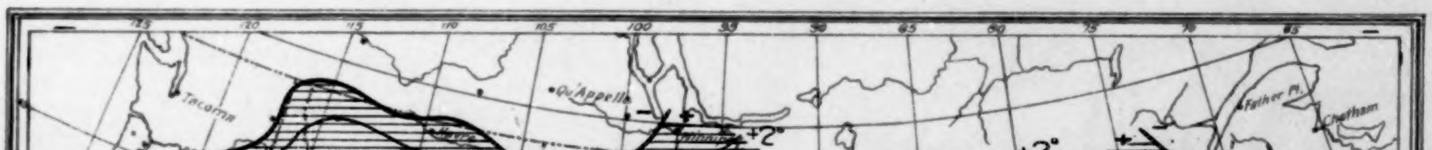


FIG. 2.—Temperature departures. Shaded area indicates positive departures.

 Chart X. Monthly Mean Pressure, Resultant Winds, and Temperature Departures, April, 1907.

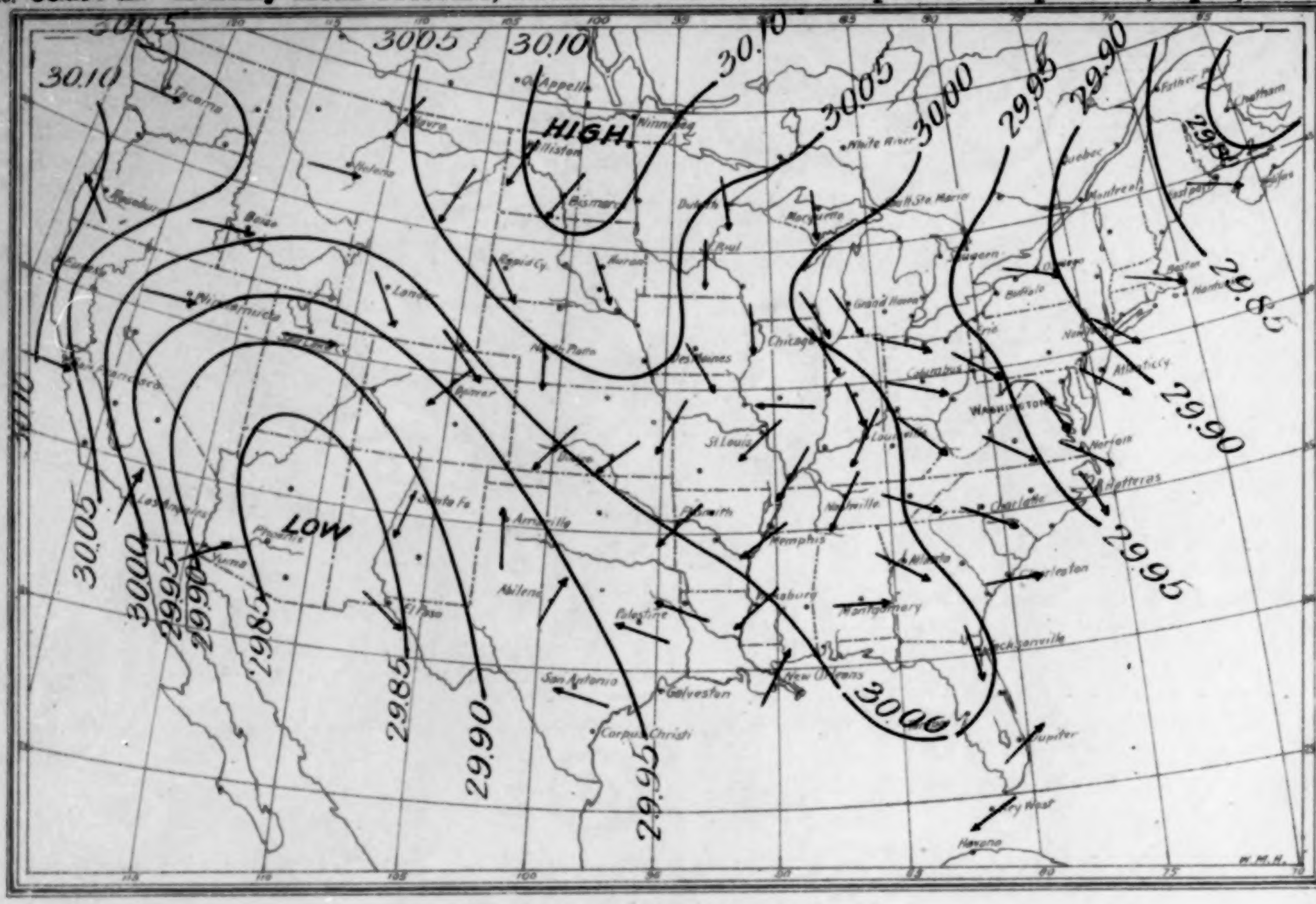


Fig. 3.—Pressure and winds. A cold April.

Fig. 4.—Temperature departures. Unshaded area indicates negative departures.